TM 11-273

WAR DEPARTMENT TECHNICAL MANUAL

RADIO SETS

SCR-193-D,-G,-H,-J,-K,

-KB,-KW,-L,-M,-P,-Q,

-R,-S,-T, and -U

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This manual supersedes TM 11-273, 12 April 1941, including C 1, 18 October 1941; C 2, 8 October 1942, and C 3, 10 March 1944; TB 11-273-1, 8 August 1944, and TB 11-273-2, 11 August 1944.

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Refer to FM 21–6 for explanation of distribution formula.

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DESTRUCTION NOTICE

WHY—To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW—1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut—Use axes, handaxes, machetes.

3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives—Use firearms, grenades, TNT.

5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—1. Smash—Cabinet or case, chassis, tubes, tuning capacitors, instrument panel, and every electrical and mechanical part. Rip out all wiring in the units. Destroy nameplates and circuit labels.

2. Cut—Wire, cables, cords, and covers.

3. Burn—Calibration charts, technical manuals, and other printed matter.

4. Bend—Antenna sections.

5. Bury or scatter—Any or all of the above pieces after demolishing the equipment.

DESTROY EVERYTHING

SAFETY NOTICE

Voltages as high as 1,000 volts are used in the operation of this equipment. These voltages are dangerous to life.

Do not change tubes or make adjustments inside the set with the high-voltage supply ON.

All panels giving access to voltages above 500 volts are provided with interlocks to shut off the dynamotor when opened. A few service checks must be made inside the set with the high voltage on. When making these checks, always have the immediate presence and assistance of another person capable of rendering aid. Keep one hand in your pocket while making high-voltage measurements. This will prevent touching the electrical circuit with more than one part of the body at one time.

Be sure that high-voltage plate circuits are dead before performing preventive maintenance on this equipment. High-voltage capacitors in power supplies must be discharged manually before performing preventive maintenance operations.

Servicing should be done with the vehicular battery circuit open. Shorting this battery circuit will cause a flash and severe burns unless the power is turned off.

R-f (radio-frequency) voltages as high as 5,000 volts may develop on the antenna of this radio set. Do not touch the antenna while the set is turned on.

Do not add gasoline to the vehicle fuel tank when the transmitter is on. R-f voltage may cause a spark resulting in an explosion. Turn off the radio transmitter and KEEP it off until refueling is finished.

FIRST AID FOR ELECTRIC SHOCK

Rescue

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire; however, be watchful of electric flashes.

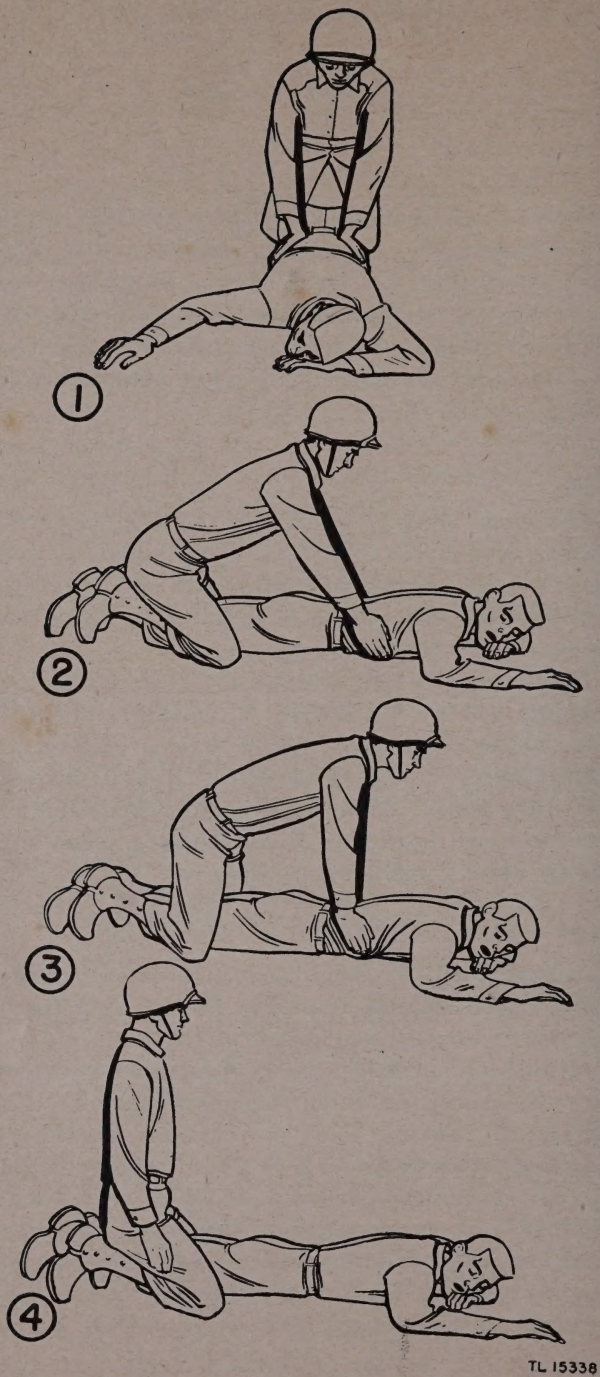
Symptoms

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breathing center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

Treatment

a. Start artificial respiration immediately. At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only,* remove the victim to another location, but no farther than is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. During transportation, other methods of resuscitation may be used, if the method of transportation prohibits the use of the Shaeffer prone pressure method. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth to mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.



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b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing (① and ②).

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such a manner that—

(1) The operator's arms and thighs will be vertical while applying pressure on the small of the victim's back (③).

(2) The operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib.

(3) The heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim (①).

(4) The operator's elbows are straight and locked.

f. The resuscitation procedure is as follows:

(1) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(2) Swing back, suddenly releasing pressure, and sit on the heels (④).

(3) After 2 seconds' rest, swing forward again positioning the hands, and apply pressure for another second (② and ③).

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4 seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, one thousand and three, one thousand and four, etc. This method of counting facilitates accurate timing. The exact frequency of the operating cycle of resuscitation is of utmost importance.

h. Artificial respiration should be continued without interruption until

the victim regains normal breathing or until pronounced dead by a medical officer. It may be necessary to continue resuscitation for several hours. For this reason relief operators should be used if available.

Method of Relieving Operator

The relief operator kneels beside the operator, assuming the same position on an imaginary victim, and follows the operator through three or four complete cycles. When he is sure that he has the correct rhythm, on the next forward swing of the operator the relief operator places his hands on the top of the operator's hands without applying pressure. This indicates to the operator that the relief operator is ready to take over. On the backward swing, the operator moves off the victim, to the side, and the relief operator takes the position of the operator. On the next forward swing, the operator being relieved assumes the position on an imaginary victim beside the new operator, and follows through two or three complete cycles of the new operator, or until he is sure that the new operator has the correct rhythm. The operator being relieved remains alert to take over instantly if the new operator should falter or hesitate on the cycle. During the process of relief, the original operator should count aloud, by thousands, to give the relief operator the correct timing.

Inhalant Stimulants

If an inhalant is used, such as aromatic spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostrils for comfortable breathing. Be sure that the inhalant is not held closer to the victim's nostrils and then only for short duration, 1 or 2 seconds every minute.

Liquid Stimulants

After the victim has regained consciousness, he may be given a glass of water with ½ teaspoon of aromatic spirits of ammonia added, or he may be offered hot coffee or hot tea as a stimulant. DO NOT GIVE AN UNCONSCIOUS VICTIM ANY LIQUIDS.

Cautions

a. After the victim revives, keep him lying quietly. Do not allow him to get up and walk even though he may feel that he is strong enough. Any injury which a person might have received, including electric shock, may bring about a condition of shock or fainting. This condition should be guarded against at all times. Shock is present if the victim is pale

and has a cold sweat, if his pulse is weak and rapid, and his breathing is short and gasping.

b. Keep the victim lying flat on his back, with his head lower than the rest of his body, and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim may suddenly stop breathing and require additional artificial respiration. For this reason, he must be carefully watched. NEVER LEAVE A RESUSCITATED PERSON ALONE UNTIL IT IS *CERTAIN* THAT HE IS FULLY CONSCIOUS AND BREATHING NORMALLY.

Figure 1. Radio Set SCR–193–J in operation.

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PART ONE

INTRODUCTION

Section I. DESCRIPTION

1. General

a. Radio Set SCR–193–(*) is made up of Radio Transmitter BC–191–( ), Radio Receiver BC–312–( ), Dynamotor BD–77–( ), and additional components required for installation in the vehicle concerned. It is designed for installation in various type vehicles for the purpose of

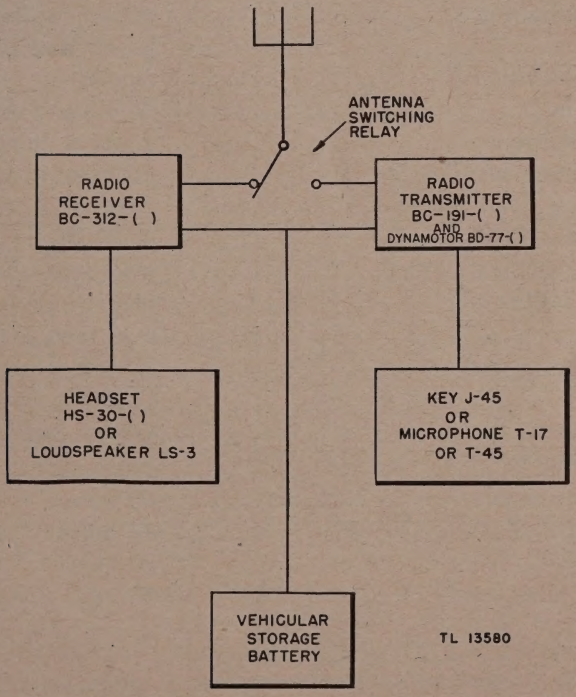


Figure 2. System block diagram of Radio Set SCR–193–(*).

providing communication either while stationary or moving. A block diagram of the radio set is shown in figure 2.

b. Although all the models of Radio Set SCR–193–(*) are basically alike, special parts are required in different installations because of varying vehicular requirements. The differences in these special components are the only differences between models.

c. This manual contains a discussion of the differences between the models and information pertaining to the operation of Radio Set SCR–193–(*). Additional information on the various components may be found in the other Technical Manuals furnished with this radio set. The symbol ( ) used after basic nomenclature throughout this manual refers to all models of the equipment concerned.

d. The symbol (*) used after basic nomenclature throughout this manual refers to certain specific models of the equipment. Thus, Radio Sets SCR–193–(*) refers to Radio Sets SCR–193–D, –G, –H, –J, –K, –KB, –KW, –L, –M, –P, –Q, –R, –S, –T, and –U.

2. Technical Characteristics

a. Radio Transmitter BC–191–( ).

Type of transmitter	master-oscillator power amplifier (mopa)	
Type of modulation	amplitude	
Power output	75 watts (approx)	
Frequency range	1,500 kc to 6,200 kc	
Tuning Unit TU–5–( )	1,500 kc to 3,000 kc	
Tuning Unit TU–6–( )	3,000 kc to 4,500 kc	
Tuning Unit TU–7–( )[1]	4,500 kc to 6,200 kc	
Types of signals transmitted	c-w, tone, and voice	
Method of modulation	plate (high-level)	
Sidetone	c-w, tone, and voice	
Primary power supply	12-volt storage battery (not a set component)	
Antenna type	vertical rod	
Distance range:[2]	*Stationary*	*Moving*
Cw	60 miles	30 miles
Tone	40 miles	20 miles
Voice	20 miles	15 miles
Number of tubes used	5	

[1] Tuning Unit TU–7–( ) recently authorized, see SB 11–32.

[2] These values are approximate in some cases, since the range will vary considerably depending upon terrain and atmospheric conditions.

Types of tubes used:

Tube type (commercial)	Signal Corps. No.	JAN No.	Function
211	VT–4–C	JAN–211	Master oscillator
211	VT–4–C	JAN–211	Power amplifier
211	VT–4–C	JAN–211	Modulator
211	VT–4–C	JAN–211	Modulator
10	VT–25	JAN–10	Speech amplifier and audio oscillator

b. Radio Receiver BC–312–( ).

Type of receiver	superheterodyne
Type of signals which can be received	c-w, tone, and voice
Frequency range	1,500 kc to 18,000 kc
Intermediate frequency	470 kc
H-f oscillator frequency	470 kc *above* signal frequency on bands A, B, and C. 470 kc *below* signal frequency on bands D, E, and F.
Power-supply input	12 volts, 2.7 amp
Output from supply	230 volts, 82 ma (Dynamotor DM–21–( ))
Number of tubes	9

Types of tubes used.

Tube type (commercial)	Signal Corps No.	JAN No.	Function
6K7	VT–86	JAN–6K7	1st r-f amplifier
6K7	VT–86	JAN–6K7	2d r-f amplifier
6C5	VT–65	JAN–6C5	H-f oscillator
6L7	VT–87	JAN–6L7	1st detector
6K7	VT–86	JAN–6K7	1st i-f amplifier
6K7	VT–86	JAN–6K7	2d i-f amplifier
6C5	VT–65	JAN–6C5	C-w oscillator
6R7	VT–88	JAN–6R7	2d detector, 1st a-f amplifier and avc
6F6	VT–66	JAN–6F6	Audio amplifier

3. Frequency Spectrum Chart

The frequency spectrum chart (fig. 3) indicates the frequency coverage available in the various radio sets. The radio sets which operate in the frequency range of Radio Set SCR–193–(*) are clearly shown.

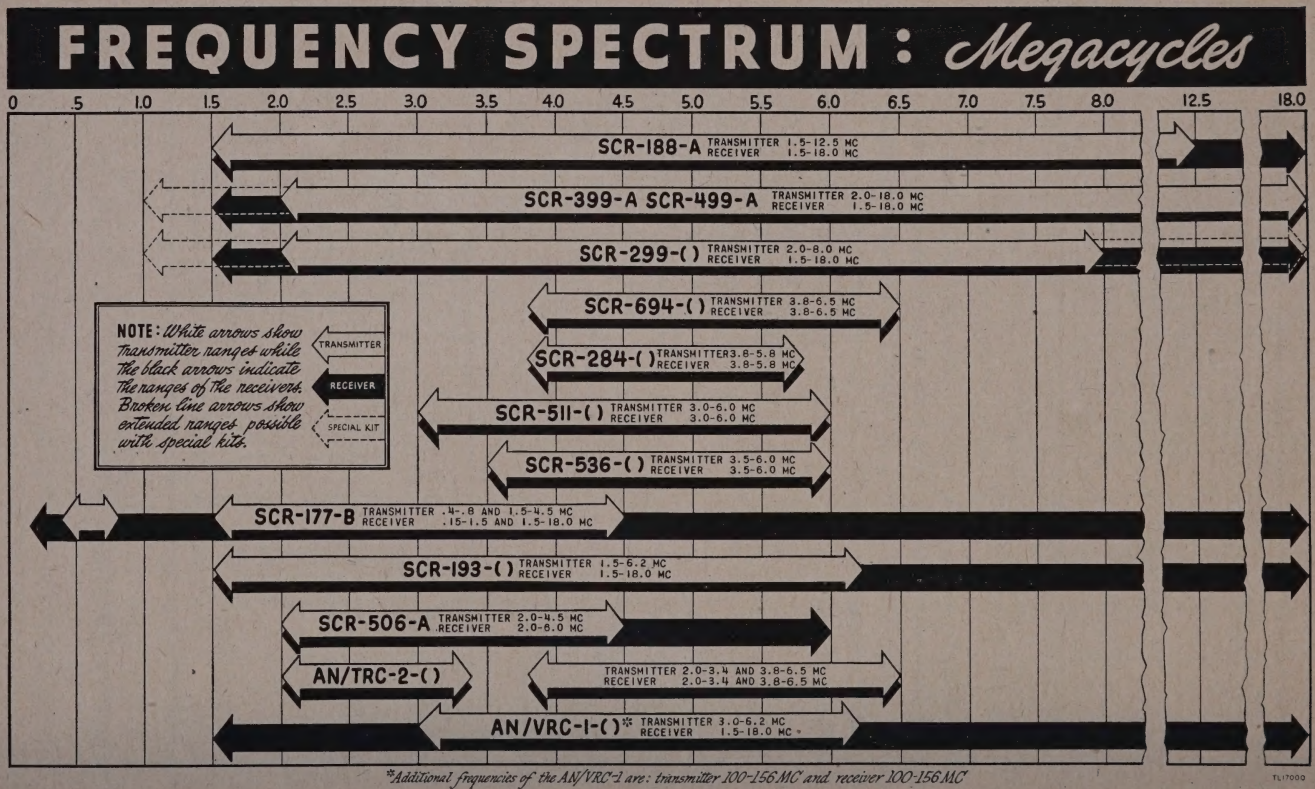


Figure 3. Frequency spectrum chart.

4. Table of Components

a. The major components of the radio set are as follows:

Component	Height (in.)	Width (in.)	Depth (in.)	Weight (lb.)
Dynamotor Unit BD–77–( )	11	11	7½	37.3
Radio Receiver BC–312–( )	10¾	18	9	58
Radio Transmitter BC–191–( )	20 13/16	23⅛	9 5/16	55.75
Transmitter tuning units	7¾ (ea.)	16¾ (ea.)	8¾ (ea.)	14.43 (ea.)

b. A complete components parts list follows:

	Radio Set SCR–193														
Component parts	–D	–G	–H	–J	–K	–KB	–KW	–L	–M	–P	–Q	–R	–S	–T	–U
Antenna A–27	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Antenna AN–24–A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bag of hardware	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Box BX–8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Box BX–19–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Box BX–21	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bracket FT–320	..	..	x	..	..	..	..	..	..	..	..	..	..	..	..
Bracket FT–422	..	..	..	..	..	..	..	..	..	..	..	..	..	..	x
Bracket, steel, SC–A–8639	..	x	..	..	..	..	..	..	..	..	..	..	..	..	..
Bracket, SC–A–7112	..	..	..	x	..	..	..	..	..	..	..	..	..	..	..
Bracket, SC–D–8700–A	..	..	..	..	..	..	..	..	x	..	..	..	..	..	..
Bracket, steel, inverted V	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..
Bracket, steel, L-shaped	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..
Bracket, SC–D–7194	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
Bracket, mounting, steel	..	..	..	..	..	..	..	..	x	..	..	..	x	..	..
Bracket, right-angle	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
Bracket, steel, U-shaped	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
Bracket, Z–shaped	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
Bracket, SC–D–7367	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bracket, SC–D–7262	x	x	..	..	..	..	..	..	x	x	..	..	..	..	x
Cabinet CH–60	..	..	x	..	..	..	..	..	..	..	..	..	..	x	..
Chest CH–153	x	..	..	..	..	..	..	..	..	..	x	..	..	..	x
Chest Set TD–4–( )	x	x	x	..	..	..	..	..	x	x	..	x	x	x	..
Clamp MC–421[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Clamp MC–422[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Clamp MC–423[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Clamp MC–424[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Connector, Appleton No. 61004	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..
Connector conduit	..	..	..	..	..	..	x	..	..	x	..	..	x	x	x
Cord CD–169	..	..	..	..	..	..	..	x	..	x	..	..	..	..	..
Cord CD–175	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..
Cord CD–206	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
Cord CD–226	..	..	x	..	x	..	..	..	..	..	..	..	..	x	..
Cord CD–237	..	..	..	..	..	..	..	..	..	..	..	x	..	..	x
Cord CD–239	..	..	..	..	..	..	..	x	..	x	..	..	..	..	..
Cord CD–267	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cord CD–269	..	..	..	x	..	..	..	..	..	..	..	..	..	..	..
Cord CD–270	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..
Cord CD–292	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
Cord CD–307–( )	..	..	..	x	x	x	x	x	..	..	x	..	..	x	x
Cord CD–318–( )	x	x	x	x	..	..	x	x	x	x	x	x	x	x	x
Cord CD–320	x	..	..	..	..	..	..	..	..	..	x	..	..	..	..
Cord CD–345	x	..	..	..	..	..	..	..	..	..	x	..	..	..	..
Cord CD–359	..	..	..	..	..	..	..	..	..	..	..	..	x	..	x

Component parts	Radio Set SCR–193														
	–D	–G	–H	–J	–K	–KB	–KW	–L	–M	–P	–Q	–R	–S	–T	–U
Cord CD–360	..	x	..	..	..	..	..	..	..	..	..	x	..	..	..
Cord CD–410	x	x	..	x	x	x	..	x	..	..	x	x	..	x	..
Cord CD–411	x	..	x	..	..	..	..	..	..	..	x	..	..	x	..
Cord CD–422	..	..	..	..	..	..	..	x	..	..	..	..	x	x	x
Cord CD–424	..	..	..	..	..	..	..	..	..	..	..	x	..	..	x
Cord CD–434	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..
Cord CD–440	..	..	x	..	x	..	..	..	..	..	..	..	..	x	..
Cord CD–471	..	..	..	..	..	..	..	..	x	..	..	..	..	..	..
Cord CD–472	..	x	..	..	..	..	..	..	x	..	..	..	..	..	..
Cord CD–473	..	x	..	..	..	..	..	..	x	..	..	..	..	..	..
Cord CD–474	..	..	..	..	x	x	..	..	x	..	..	..	..	..	..
Cord CD–603	..	..	x	..	..	..	..	..	..	..	..	..	..	..	..
Cord CD–604	..	..	..	x	x	x	x	x	..	..	x	..	..	x	x
Cord CD–670	..	..	..	x	..	x	..	..	..	..	..	..	..	..	..
Cord CD–676	..	..	..	x	..	x	..	..	..	..	..	..	..	..	..
Cord CD–1087	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..
Cord CD–1171	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..
Cord CD–1172	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..
Cord CD–1173	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..
Cordage CO–131	..	..	..	..	..	..	x	..	..	x	..	..	x	x	x
Cord CO–165–( )	..	..	..	..	..	..	..	..	x	..	..	x	..	..	..
Cord CO–166–A	..	..	..	..	x	..	..	..	..	..	..	..	..	..	..
Cord CO–170–A	..	..	x	..	..	..	..	..	..	..	..	..	x	..	..
Cord CO–175–A	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..
Cord CO–188	..	..	..	x	..	..	..	x	..	..	..	..	..	..	..
Cord CO–189	x	..	..	..	..	..	..	x	..	..	x	x	..	x	..
Cord CO–260	..	x	..	..	..	..	..	..	x	..	..	..	..	..	x
Cord CO–273	..	..	..	..	..	x	..	..	..	..	..	..	..	..	..
Cover BG–67–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cover BG–75–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cover BG–78–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cover BG–79–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cover BG–84	x	..	..	..	..	..	..	..	..	..	x	..	..	..	..
Cover CW–41/U	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Dynamotor Unit BD–77–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Frame FM–43	..	..	..	x	..	..	..	..	..	..	..	..	..	..	..
Frame FM–55	..	..	..	..	..	..	..	x	..	..	..	..	..	..	..
Frame FM–56	..	..	..	..	..	..	..	x	..	..	..	..	..	..	..
Fuse FU–20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Fuse Link M–160	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Headset H–16/U	x	x	x	..	..	..	..	..	x	x	..	x	x	x	..
Headset HS–30–( )	..	..	..	x	x	x	x	x	..	..	x	..	..	..	x
Insulator IN–86	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Insulator IN–98	..	..	x	..	x	x	x	..	..	x	..	..	..	x	..
Insulator IN–101	x	..	..	..	..	..	..	..	..	..	..	..	..	..	x
Insulator IN–104	x	x	x	x	..	..	..	x	x	x	x	x	x	x	x
Insulator IN–121	..	..	x	x	x	x	x	..	..	x	x	..	..	x	x
Installations instructions	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Installation Kit	..	..	..	..	..	..	..	..	..	..	..	x	..	..	..
Installation Kit MC–515	..	..	..	..	..	x	..	..	..	..	..	..	..	..	..
Installation Kit MC–449	..	..	..	..	x	x	..	..	..	..	..	..	..	..	..
Junction Box TM–188	..	..	..	..	..	..	..	x	x	x	..	x	x	x	x
Key J–45	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Kit, adapter, SC–A–7119–A	..	..	..	..	..	..	..	..	..	..	x	..	..	..	..
Loudspeaker LS–3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Base Bracket MP–53	..	..	x	..	..	..	..	..	..	..	..	..	..	..	..
Mast Base Bracket MP–54	..	..	..	..	..	..	..	..	x	..	..	x	..	x	..
Mast Base Bracket MP–58	..	..	..	..	..	..	..	x	..	..	..	..	..	..	..
Mast Base MP–57[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Base MP–65–( )[2]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Bracket MP–50–( )	..	..	..	..	x	x	..	..	..	..	..	..	..	..	x

Component parts	Radio Set SCR–193														
	–D	–G	–H	–J	–K	–KB	–KW	–L	–M	–P	–Q	–R	–S	–T	–U
Mast Bracket MP–63	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..
Mast Section MS–49[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Section MS–50[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Section MS–51[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Section MS–52[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Section MS–53[1]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Section MS–116[2]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Section MS–117[2]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mast Section MS–118[2]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Microphone T–17–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Microphone T–45	x	x	x	x	..	..	x	x	x	x	x	x	x	x	x
Microphone Cover M–367	x	x	x	x	..	..	x	x	x	x	x	x	x	x	x
Mounting FT–172	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mounting FT–178	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mounting FT–284	..	..	x	..	..	..	..	..	..	..	..	..	..	x	..
Mounting plate	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
Plate, SC–D–4773	..	x	..	..	..	..	..	..	..	..	..	..	..	..	..
Radio Receiver BC–312–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Radio Transmitter BC–191–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Reinforcing Plate FT–429	..	..	..	..	..	..	..	..	..	..	..	..	..	..	x
Roll BG–56–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Rope RP–5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Shelf mounting, lower	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..
Shelf, mounting, upper	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..
Shelf, radio, mounting	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
Socket Cap M–163–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Terminal Block TM–183	x	x	x	x	x	x	x	..	..	..	x	..	..	..	..
TM 11–273	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Transmitting Tuning Unit TU–5–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Transmitting Tuning Unit TU–6–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Transmitting Tuning Unit TU–7–( )	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Wire W–128	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

[1]Issued on early procurements.

[2]Issued on late procurements.

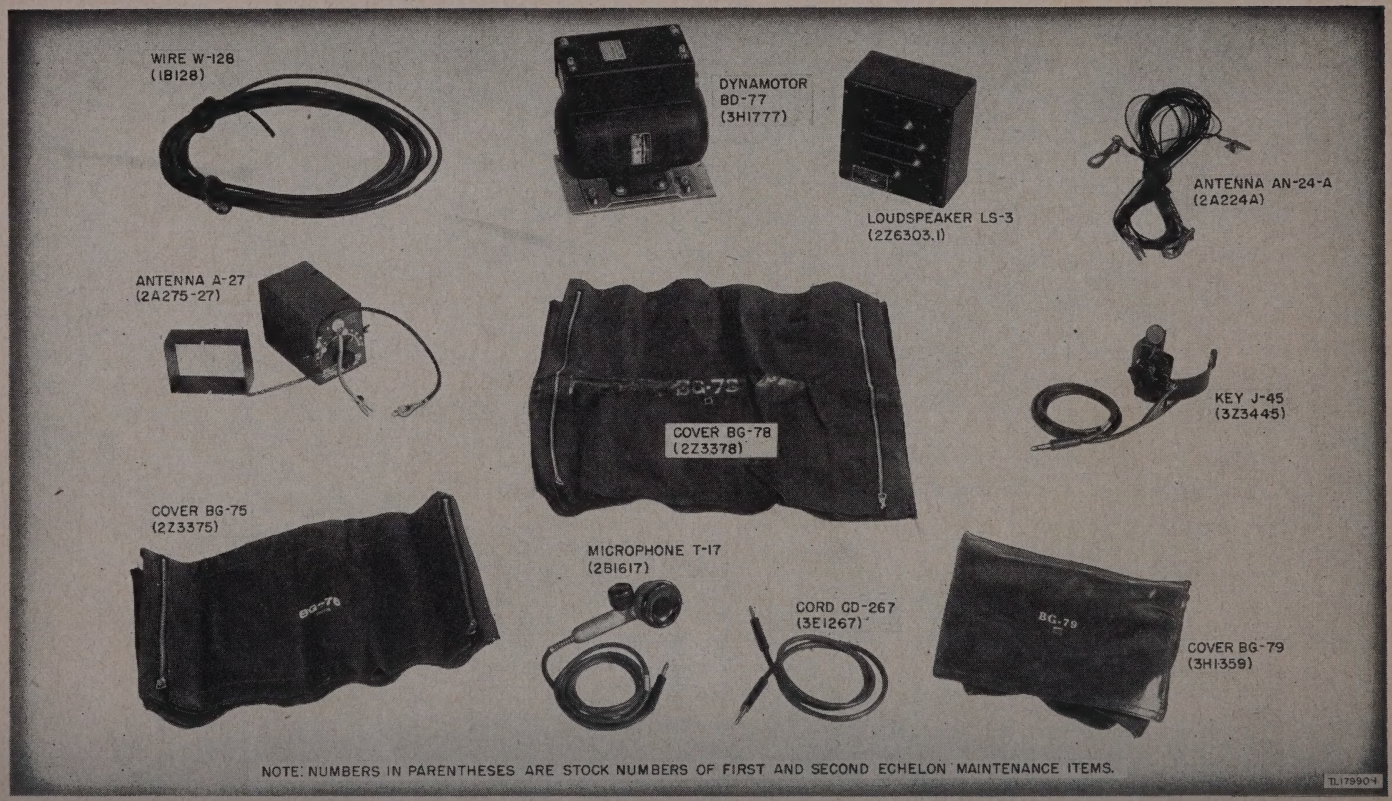


Figure 4. First and second echelon maintenance items for Radio Set SCR–193–(*).

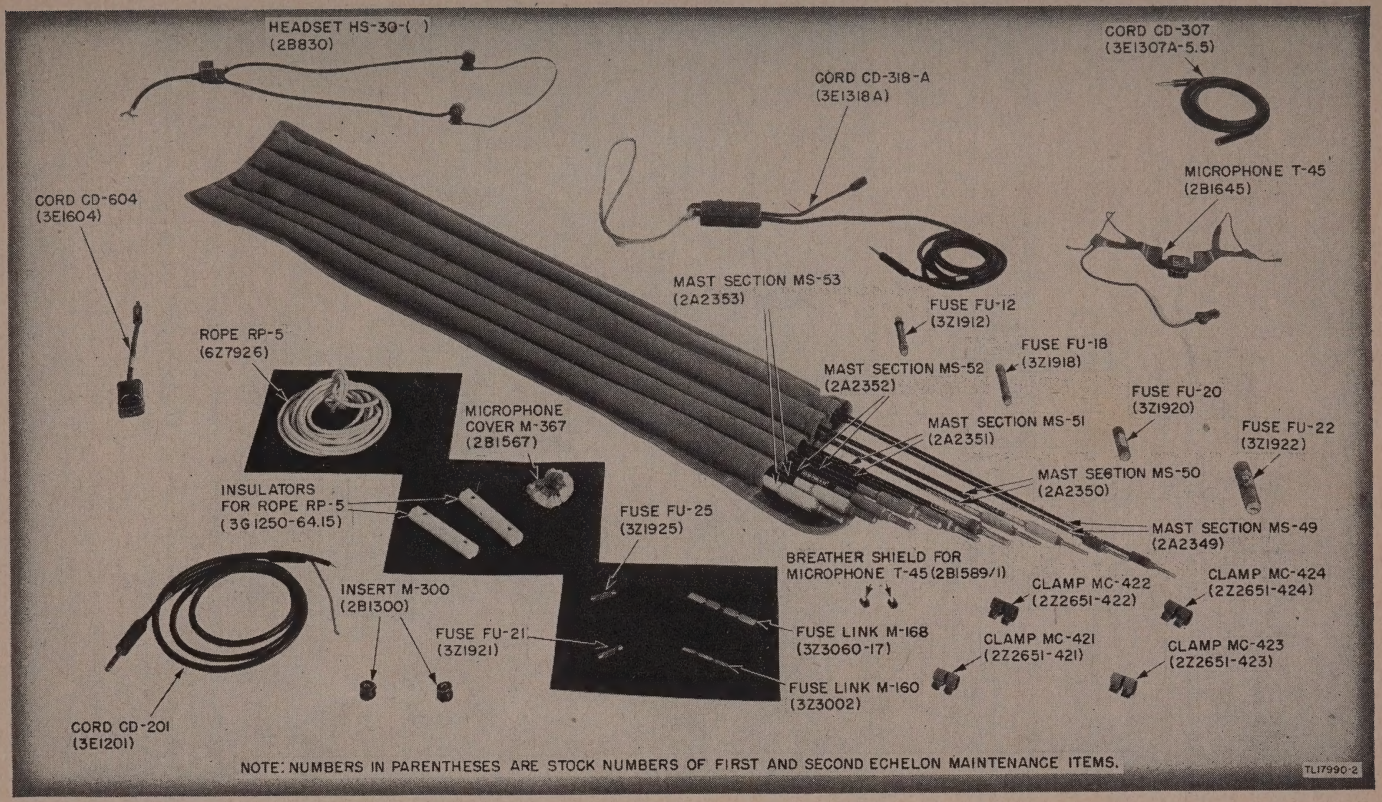


Figure 5. First and second echelon maintenance items for Radio Set SCR–193–(*).

5. Packaging Data

The basic units common to each Radio Set SCR–193–(*) (12-volt) are packed in six shipping containers.*

a. The contents of each box are as follows:

Box No.	Component	No. per box
1 and 2	Radio Transmitter BC–191–( ) (Includes Tuning Units TU–5–( ), TU–6–( ), and TU–7–( )	1
3	Radio Receiver BC–312–( )	1
4	Dynamotor Unit BD–77–( )	1
5	Antenna A–27	1
	Box BX–8	1
	Box BX–19–( )	1
	Box BX–21	1
	Loudspeaker LS–3	1
6	Antenna AN–24–A	1
	Clamp MC–421[1]	2
	Clamp MC–422[1]	2
	Clamp MC–423[1]	2
	Clamp MC–424[1]	2
	Cord CD–267	1
	Cover BG–67–( )[1]	1
	Cover BG–75–( )	1
	Cover BG–78–( )	1
	Cover BG–79–( )	1
	Insulator IN–86	3
	Key J–45	1
	Mast Base MP–57[1]	1
	Mast Section MS–49[1]	2
	Mast Section MS–50[1]	2
	Mast Section MS–51[1]	2
	Mast Section MS–52[1]	2
	Mast Section MS–53[1]	2
	Mounting FT–172	1
	Mounting FT–178	1
	Roll BG–56–( )	1
	Rope RP–5	50 ft.
	Socket Cap M–163–( )	1
	TM 11–273	2
	Mast Base MP–65–( )[2]	1
	Mast Section MS–116[2]	6
	Mast Section MS–117[2]	2
	Mast Section MS–118[2]	2

* An additional kit is necessary for each installation. A list of the components of this installation kit will be found in the technical manual of the TM 11–2700 series which applies to the vehicle concerned.

[1] Issued on early procurements.

[2] Issued on late procurements.

b. The weights and dimensions of each box are as follows:

Box No.	Width (in.)	Length (in.)	Depth (in.)	Gross weight (lb.)	Cubage (cu. ft.)
1	14¼	28⅛	23⅞	183	5.4
2	20⅛	21⅞	11⅞	114	3.1
3	27½	16¾	15	111	4.0
4	13½	15¾	15½	80	1.9
5	19	24½	13⅜	85	3.6
6	10¾	45	7⅛	75	2.0

6. Description of Major Components

a. Radio Receiver BC–312–( ) (fig. 6). For a complete description of Radio Receiver BC–312–( ), refer to TM 11–850.

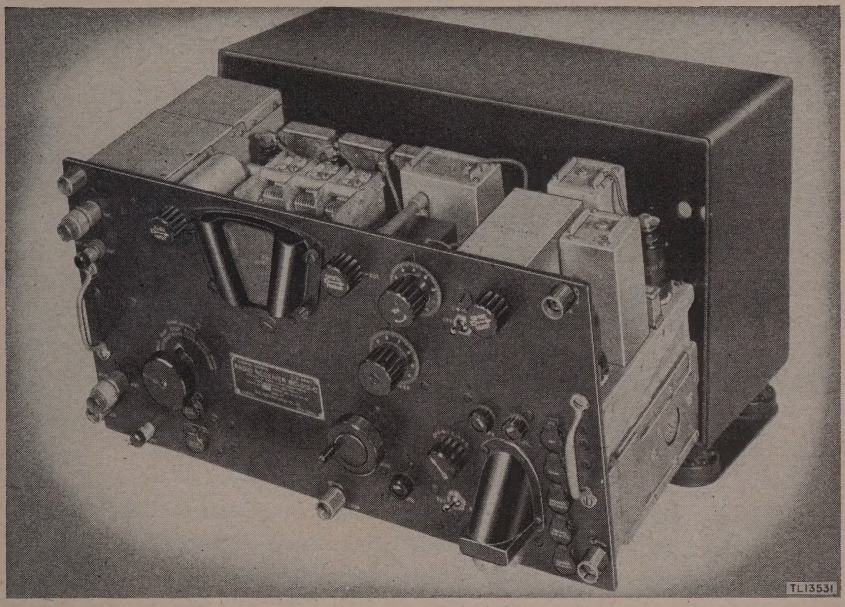


Figure 6. Radio Receiver BC–312–( ).

b. Radio Transmitter BC–191–( ) (fig. 7). For a complete description of Radio Transmitter BC–191–( ), refer to TM 11–800.

c. Dynamotor Unit BD–77–( ) (fig. 8). Dynamotor Unit BD–77( ) receives its power from a 12-volt storage battery and supplies high voltage to the transmitter. It is fastened to Mounting FT–107–( ) by means of four snap-slide catches. A relay fuse box is mounted on top

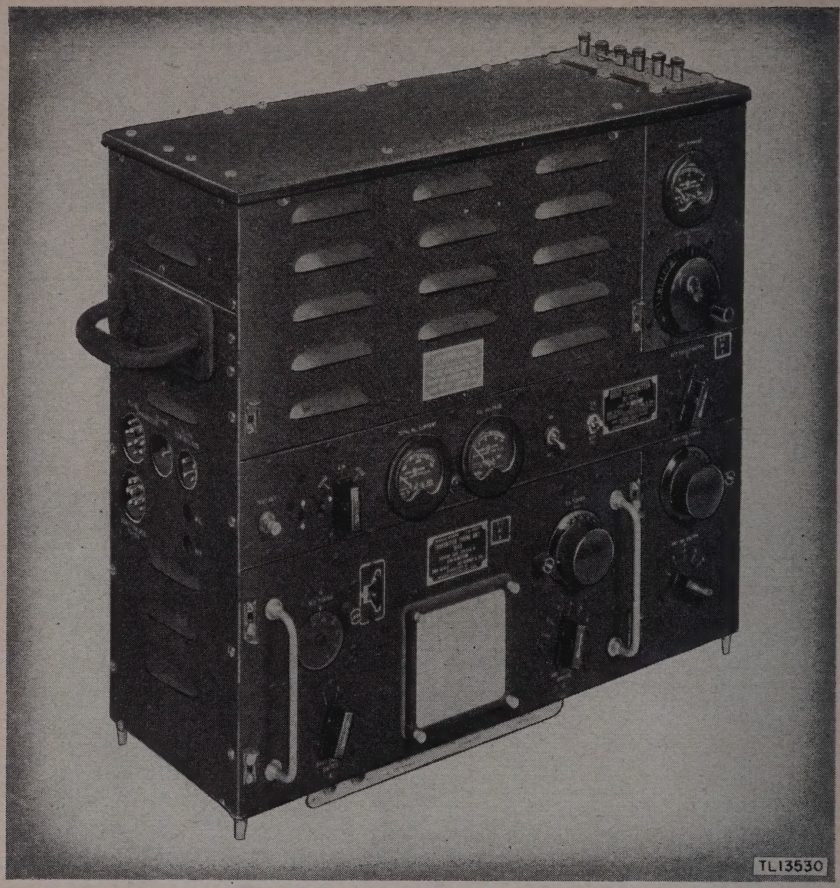


Figure 7. Radio Transmitter BC–191–( ).

of the dynamotor and contains a starting relay, fuses, a noise-filter system, and the terminating receptables from which output voltages and control circuits are fed to selected points in the circuit. Additional information concerning the dynamotor may be found in TM 11–934.

d. Transmitter Tuning Unit: TU–5–( ), TU–6–( ), and TU–7–( ). These plug-in tuning units determine the frequency range of the transmitter. (See TM 11–800.)

e. Cabinet CH–60 (fig. 9). Cabinet CH–60 is a steel cabinet with two hinged removable doors. It is divided into three compartments by means of metal partitions. In Radio Sets SCR–193–H, and –T, it houses the receiver, transmitter and dynamotor.

f. Mast Base MP–57 and Mast Base MP–65. Either Mast Base

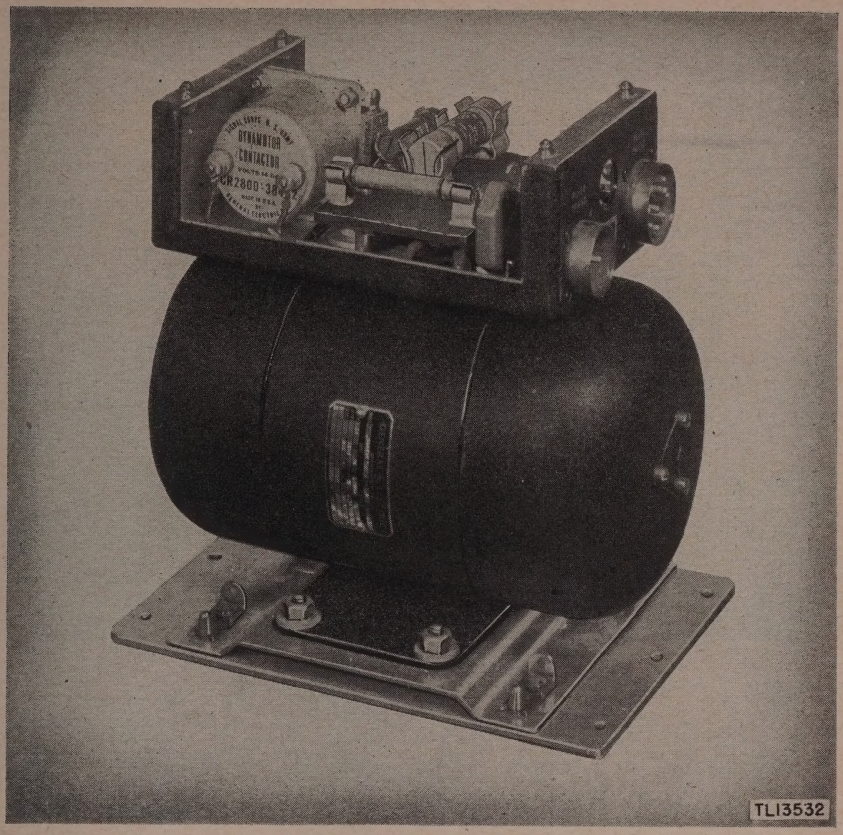


Figure 8. Dynamotor Unit BD–77–( ).

MP–57 or Mast Base MP–65 is used as an insulated support for the antenna mast sections. A helical spring in the base of the mounting prolongs the life of the mast sections by allowing them to give under strain, such as from an overhanging limb.

g. Mast Sections MS–49 to MS–53 (fig. 10). These flexible steel sections fasten together to form a 15½-foot antenna. Mast Section MS–49 is the top section of the antenna; the other sections follow in numerical sequence down to the mast base (MS–49, MS–50, etc.). The ends of the various sections to be joined are painted in matching colors. These mast sections are used with Mast Base MP–57.

h. Mast Sections MS–116 to MS–118 (fig. 11). These sections, made of flexible steel, are all 38 inches in length. Several MS–116 sections can be used to increase the antenna length. These mast sections are used only with Mast Base MP–65–( ).

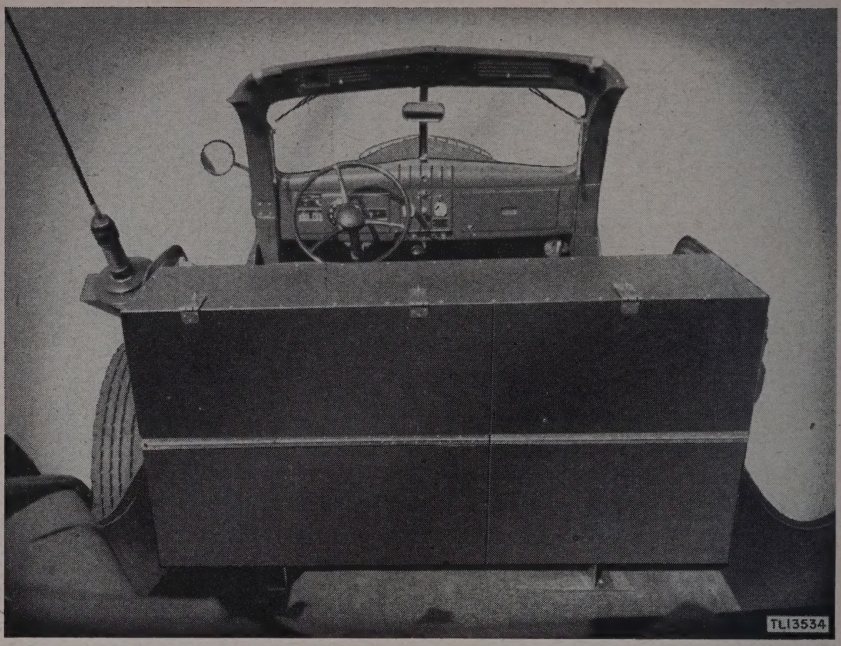


Figure 9. Cabinet CH–60.

7. Differences in Models

Each model is installed in a different vehicle. Special parts are required for each installation (par. 4). A chart showing the different vehicles in which each model is installed follows:

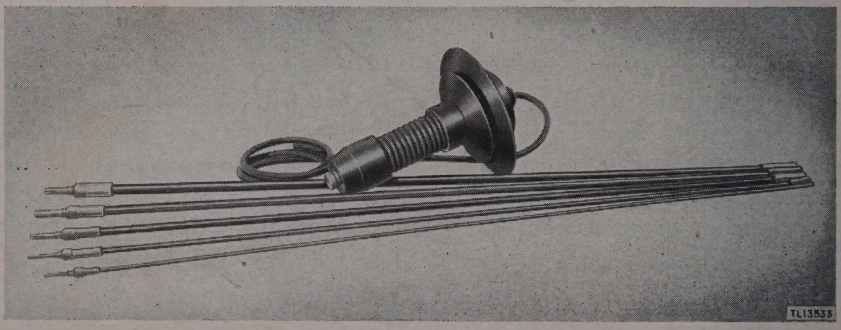


Figure 10. Mast Base MP–57 and Mast Sections MS–49, MS–50, MS–51, MS–52, and MS–53.

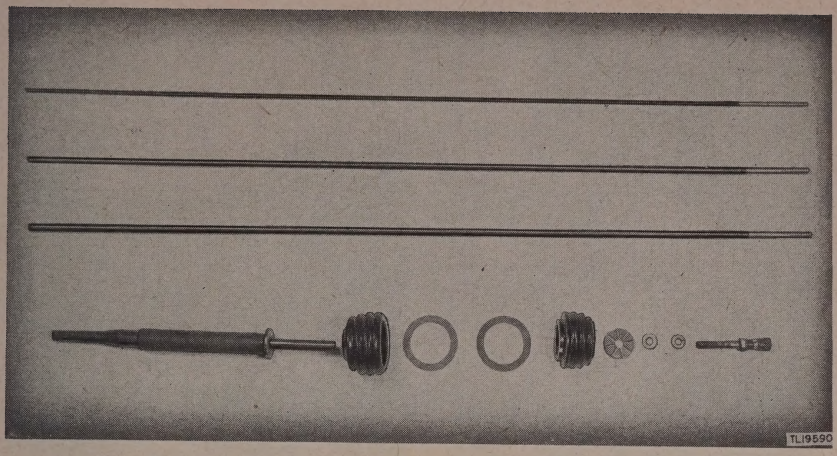


Figure 11. Mast Base MP–65–( ) and Mast Sections MS–116, MS–117, and MS–118.

Radio Set SCR–183	Installed in–
–D	Car, Scout, M3A1.
–G	Car, Half-track, M2, M2A1.
–H	Carrier, Personnel, Half-track, M3.
–J	Truck, Carryall, ¾-ton, 4x4.
–K	Truck, ¼-ton, 4x4.
–KB	Truck, ¼-ton, 4x4.
–KW	Truck, ¼-ton, 4x4.
–L	Truck, Amphibian, ¼-ton, 4x4.
–M	Car, Half-track, M9A1.
–P	Car, Armored, Light, M8, (6x6).
–Q	Truck, Command, ¾-ton, 4x4.
–R	Car, Half-track, M3A2.
–S	Carrier, Cargo, M29.
–T	Carrier, Personnel, Half-track, M3A1, M5, M5A1.
–U	Truck, Weapons Carrier, ¾-ton, 4x4.

Section II. INSTALLATION OF RADIO SET SCR–193–(*)

8. Siting (fig. 12)

Choice of location is an important factor in obtaining maximum performance from the unit. Choose a location which is free from obstructions, whether natural or man-made. Tall metal structures; power, telegraph, or telephone lines; intervening high ground; etc., may considerably shorten the useful communication range. A wire antenna, of greater length than the standard mast antenna, installed between the mast base and an elevated object will usually improve the performance of the radio sets.

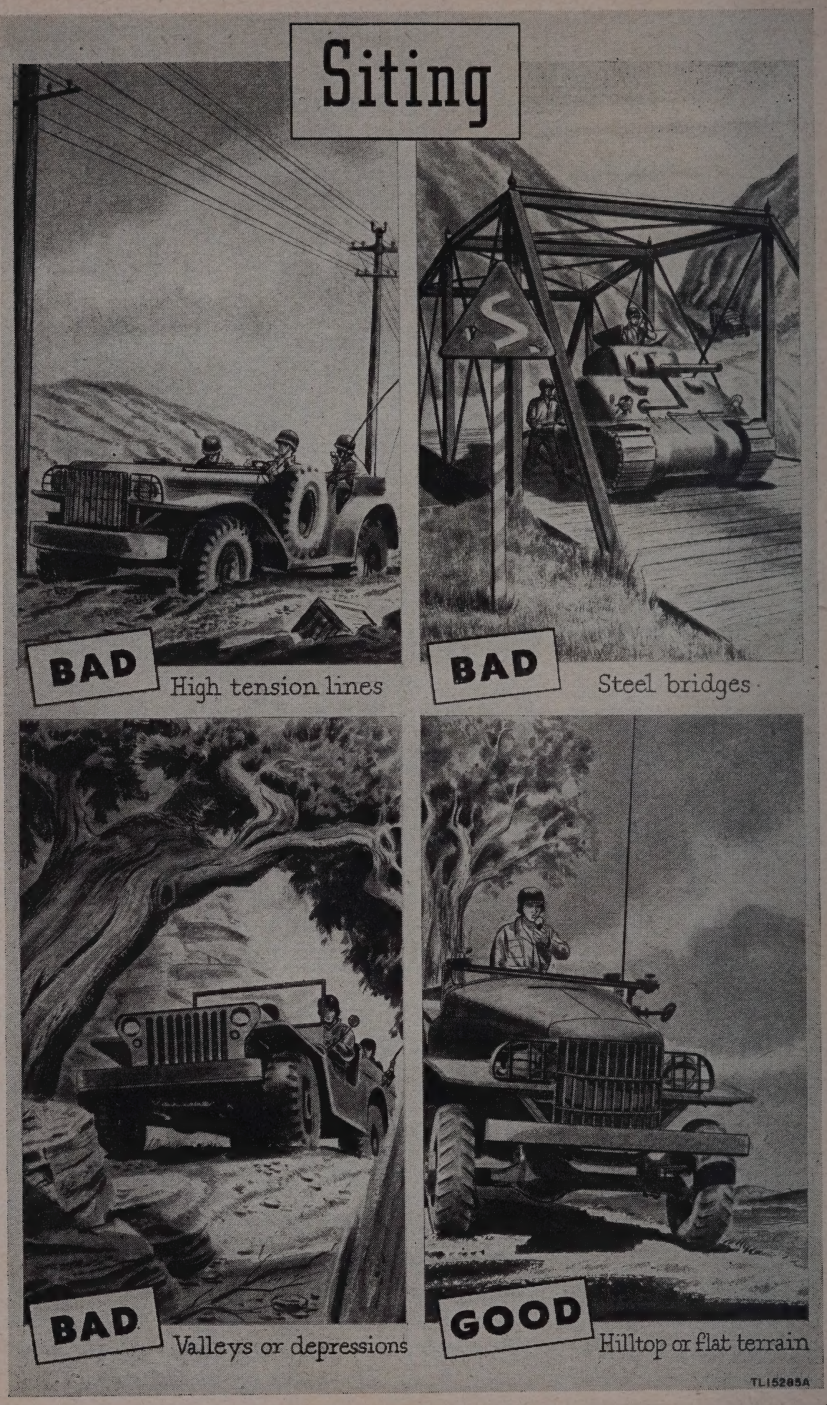


Figure 12. Siting.

9. Unpacking, Uncrating, and Checking (fig. 13)

a. General. The contents of all packages are stenciled directly on the box. A packing slip in a moistureproof inclosure is stapled to each box and is protected by a heavy black paper covering. An orange band painted around the center of the box and a stripe across each end indicate packing for export. In addition, export packing is labeled as follows: "Packed with dehydrating agent. Do Not Open Until Ready For Use." An orange disc indicates that a box is only part of a shipment. One slant six (1/6) on box No. 1 is translated as "this is box No. 1 of 6 boxes required to complete one Radio Set SCR–193–(*)."

b. Step-by-step Procedure. The following procedure is applicable to all boxes and will facilitate unpacking:

(1) Bring the boxes as close as possible to the point where the equipment will be used.

(2) Read the packing slip carefully so that unpacking will be done in logical sequence.

(3) When removing nails, use a nail puller. Vitally needed equipment may be damaged if sides are pried off.

(4) Cut the steel straps. Remove the packing case top and take out all protective wrapping.

(5) Handle all parts carefully to avoid damage. As parts are removed, check against the packing slip.

(6) Double check all packing material to make certain that no parts are lost or mislaid. Check also to make certain that no parts have been damaged in shipment or while unpacking.

(7) When opening boxes packed for export, tear open the waterproof box liner and the moistureproof and vaporproof barrier. If shears are available, cut off the heat-sealed edge so that the bag may be used again, should the occasion arise.

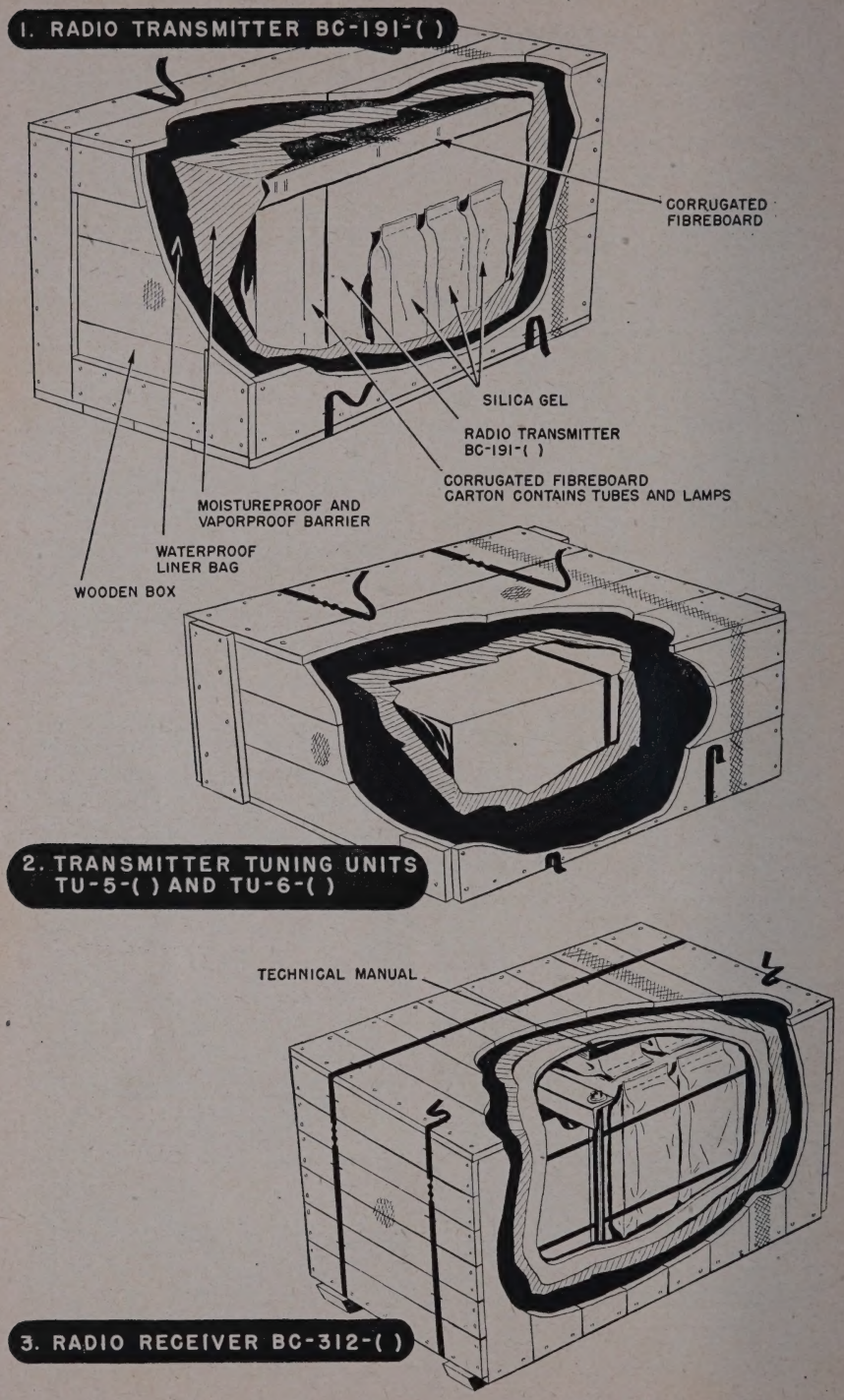
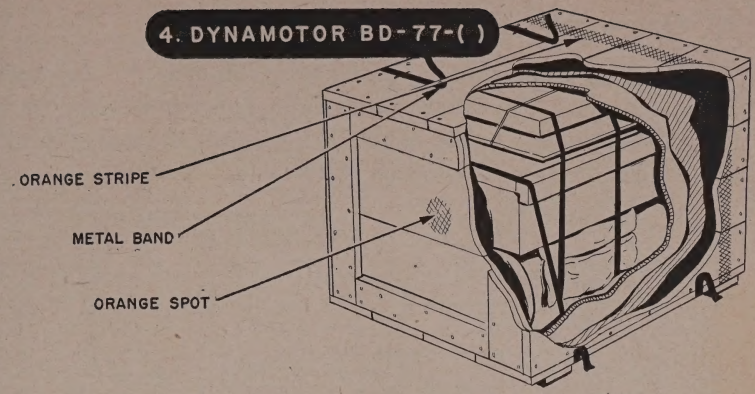
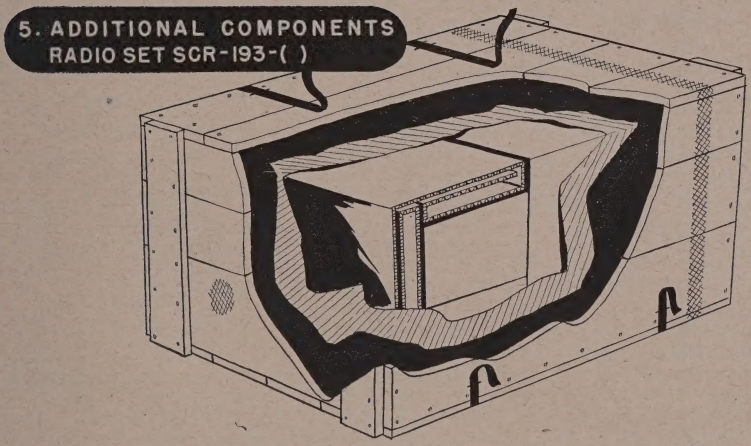
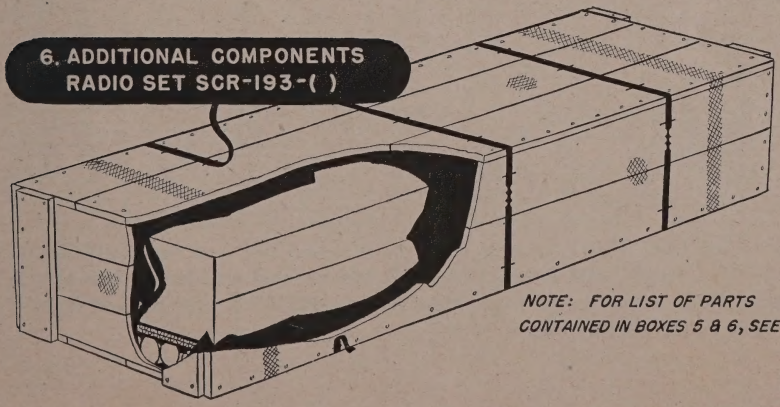


Figure 13. Cut-away view showing packaging details.







NOTE: FOR LIST OF PARTS CONTAINED IN BOXES 5 & 6, SEE PAR 5

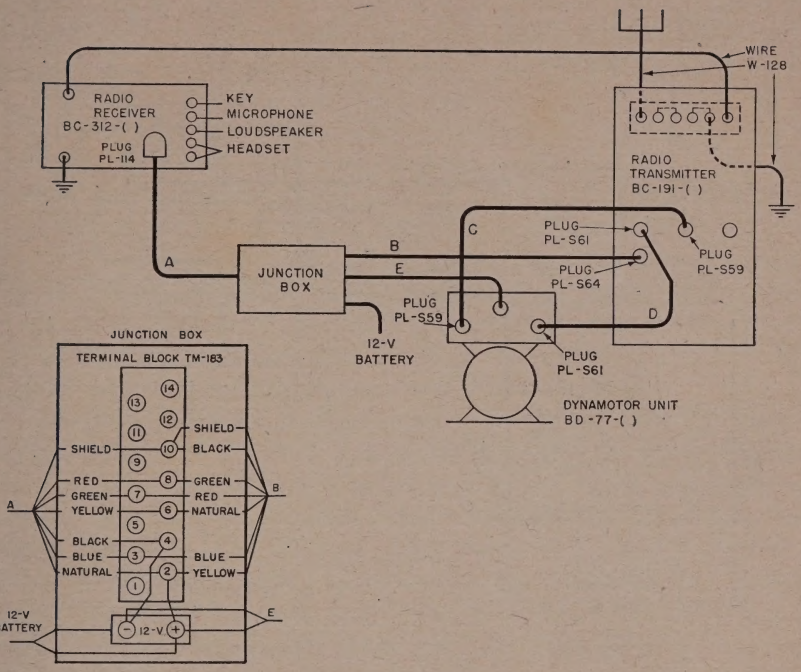
TL13634

10. Connections and Interconnections

The operating components of Radio Set SCR–193–(*) are connected by a series of cables. The cabling varies in the different installations as shown in figures 14 and 15. The following table lists all the cords which are used in the various installations of the set:

Length (in.)	Cord	Radio Set SCR–193														
		–D	–G	–H	–J	–K	–KB	–KW	–L	–M	–P	–Q	–R	–S	–T	–U
18	CD–169	..	..	..	..	..	..	..	X	..	X	..	..	..	..	..
144	CD–175	..	..	..	..	..	..	X	..	..	..	..	..	..	..	..
36	CD–206	..	..	..	..	..	..	..	..	..	..	..	..	X	..	..
48	CD–226	..	..	X	..	X	..	..	..	..	..	..	..	..	X	..
12	CD–237	..	..	..	..	..	..	..	..	..	..	..	X	..	..	X
18	CD–239	..	..	..	..	..	..	..	X	..	X	..	..	..	..	..
46	CD–267	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
30	CD–269	..	..	..	X	..	..	..	..	..	..	..	..	..	..	..
18	CD–270	..	..	..	..	..	..	X	..	..	..	..	..	..	..	..
36	CD–292	..	..	..	..	..	..	..	..	..	..	..	..	X	..	..
Varies	CD–307–( )	..	..	..	X	X	X	X	X	..	..	X	..	..	X	X
84	CD–318–( )	X	X	X	X	..	..	X	X	X	X	X	X	X	X	X
9	CD–320	X	..	..	..	..	..	..	..	..	..	X	..	..	..	..
8	CD–346	X	..	..	..	..	..	..	..	..	..	X	..	..	..	..
24	CD–359	..	..	..	..	..	..	..	..	..	..	..	..	X	..	X
48	CD–360	..	X	..	..	..	..	..	..	..	..	..	X	..	..	..
36	CD–410	X	X	..	X	X	X	..	X	..	..	X	X	..	X	..
66	CD–411	X	..	X	..	..	..	..	..	..	..	X	..	..	X	..
24	CD–422	..	..	..	..	..	..	..	X	..	..	..	..	X	X	X
12	CD–424	..	..	..	..	..	..	..	..	..	..	..	X	..	..	X
36	CD–434	..	..	..	..	..	..	..	..	..	X	..	..	..	..	..
48	CD–440	..	..	X	..	X	..	..	..	..	..	..	..	..	X	..
66	CD–471	..	..	..	..	..	..	..	..	X	..	..	..	..	..	..
24	CD–472	..	X	..	..	..	..	..	..	X	..	..	..	..	..	..
24	CD–473	..	X	..	..	..	..	..	..	X	..	..	..	..	..	..
36	CD–474	..	..	..	..	X	X	..	..	X	..	..	..	..	..	..
96	CD–603	..	..	X	..	..	..	..	..	..	..	..	..	..	..	..
Varies	CD–604	..	..	..	X	X	X	X	X	..	..	X	..	..	X	X
48	CO–670	..	..	..	X	..	X	..	..	..	..	..	..	..	..	..
54	CD–676	..	..	..	X	..	X	..	..	..	..	..	..	..	..	..
46	CD–1087	..	..	..	..	..	..	..	..	..	X	..	..	..	..	..
126	CD–1171	..	..	..	..	..	..	X	..	..	..	..	..	..	..	..
144	CD–1172	..	..	..	..	..	..	X	..	..	..	..	..	..	..	..
130	CD–1173	..	..	..	..	..	..	X	..	..	..	..	..	..	..	..
Varies	CO–131	..	..	..	..	..	..	X	..	..	X	..	..	X	X	X
18	CO–165–( )	..	..	..	..	..	..	..	..	X	..	..	X	..	..	..
36	CO–166–A	..	..	..	..	X	..	..	..	..	..	..	..	..	..	..
60	CO–170–A	..	..	X	..	..	..	..	..	..	..	..	..	X	..	..
48	CO–175–A	..	..	..	..	..	..	..	..	..	X	..	..	..	..	..
24	CO–188	..	..	..	X	..	..	..	X	..	..	..	..	..	..	..
66	CO–189	X	..	..	..	..	..	..	X	..	..	X	X	..	X	..
72	CO–260	..	X	..	..	..	..	..	..	X	..	..	..	..	..	X
54	CO–273	..	..	..	..	..	X	..	..	..	..	..	..	..	..	..

Note: Cord CD–267 is a speaker cord. Cord CD–318–( ) is used with Microphone T–45. Cord CD–307–( ) and Cord CD–604 are used on Headset HS–30–( ). Cordage CO–131 is used as the battery lead in SCR–193–KW. For use and function of all other cords, refer to figures 14 and 15.



CORD	RADIO SETS SCR-193								CONNECTORS	
	-D	-G	-H	-J	-K	-KB	-KW	-Q		
A	CORD CD-411 66-INCH (3E1411)	CORD CD-360 48-INCH (3E1360)	CORD CD-411 66-INCH (3E1411)	CORD CD-269 30-INCH (3E1269)	CORD CD-474 36-INCH (3E1474)	CORD CD-474 36-INCH (3E1474)	CORD CD-270 18-INCH (3E1270)	CORD CD-411 66-INCH (3E1411)	PL-114	APPLETON NO. 61007
B	CORD CD-410 60-INCH (3E1410)	CORD CD-410 60-INCH (3E1410)	CORD CD-603 96-INCH (3E1603)	CORD CD-410 60-INCH (3E1410)	CORD CD-410 60-INCH (3E1410)	CORD CD-410 60-INCH (3E1410)	CORD CD-1171 126-INCH (3E1999-171)	CORD CD-410 60-INCH (3E1410)	PL-S64	APPLETON NO. 61007
C	CORD CD-320 9-INCH (3E1320)	CORD CD-473 24-INCH (3E1473)	CORD CD-440 48-INCH (3E1440)	CORD CD-670 48-INCH (3E1670)	CORD CD-440 48-INCH (3E1440)	CORD CD-670 48-INCH (3E1670)	CORD CD-175 144-INCH (3E1176)	CORD CD-320 9-INCH (3E1320)	PL-S59	PL-S59
D	CORD CD-346 8-INCH (3E1346)	CORD CD-472 24-INCH (3E1472)	CORD CD-472 48-INCH (3E1226)	CORD CD-676 54-INCH (3E1676)	CORD CD-226 48-INCH (3E1226)	CORD CD-676 54-INCH (3E1676)	CORD CD-1172 144-INCH (3E1999-172)	CORD CD-346 8-INCH (3E1346)	PL-S61	PL-S61
E	CORD CD-189 66-INCH (3E2189)	CORD CD-260 72-INCH (3E2260)	CORD CD-170-A 60-INCH (3E2170A)	CORD CD-188 24-INCH (3E2188)	CORD CD-166-A 36-INCH (3E2166A)	CORD CD-273 100-INCH (3E2273)	CORD CD-1173 130½-INCH (3E1999-173)	CORD CD-189 66-INCH (3E2189)	APPLETON NO. 7289V	APPLETON NO. 7289V

NOTE: SIGNAL CORPS STOCK NUMBER FOR FIRST AND SECOND ECHELON MAINTENANCE ITEMS ARE SHOWN IN PARENTHESES.

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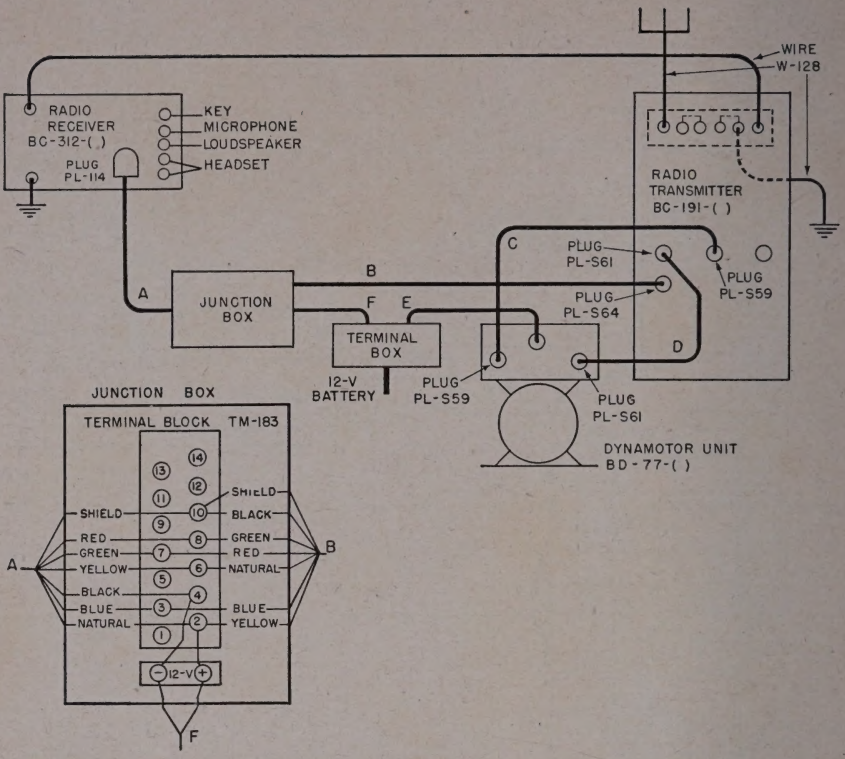
Figure 14. Cording diagram for Radio Sets SCR-193-D, -G, -H, -J, -K, -KB, -KW, and -Q.



CORD	RADIO SETS SCR-193							CONNECTORS	
	-L	-M	-P	-R	-S	-T	-U		
A	CORD CD-422 24-INCH (3E1422)	CORD CD-474 36-INCH (3E1474)	CORD CD-434 36-INCH (3E1434)	CORD CD-360 48-INCH (3E1360)	CORD CD-422 24-INCH (3E1422)	CORD CD-422 24-INCH (3E1422)	CORD CD-422 24-INCH (3E1422)	PL-114	APPLETON NO. 61007
B	CORD CD-410 60-INCH (3E1410)	CORD CD-471 66-INCH (3E1471)	CORD CD-1087 48-INCH (3E1999-87)	CORD CD-410 60-INCH (3E1410)	CORD CD-359 24-INCH (3E1359)	CORD CD-410 60-INCH (3E1410)	CORD CD-359 24-INCH (3E1359)	PL-S64	APPLETON NO. 61007
C	CORD CD-169 18-INCH (3E1169)	CORD CD-473 24-INCH (3E1473)	CORD CD-169 18-INCH (3E1169)	CORD CD-237 12-INCH (3E1237)	CORD CD-292 36-INCH (3E1292)	CORD CD-440 48-INCH (3E1440)	CORD CD-237 12-INCH (3E1237)	PL-S59	PL-S59
D	CORD CD-239 18-INCH (3E1239)	CORD CD-472 24-INCH (3E1472)	CORD CD-239 18-INCH (3E1239)	CORD CD-424 12-INCH (3E1424)	CORD CD-206 36-INCH (3E1206)	CORD CD-226 48-INCH (3E1226)	CORD CD-424 12-INCH (3E1424)	PL-S61	PL-S61
E	CORD CO-189 66-INCH (3E2189)	CORD CO-260 72-INCH (3E2260)	CORD CO-175-A 48-INCH (3E2175A)	CORD CO-189 66-INCH (3E2189)	CORD CO-170-A 60-INCH (3E2170A)	CORD CO-189 66-INCH (3E2189)	CORD CO-260 72-INCH (3E2260)	APPLETON NO. 7289V	APPLETON NO. 7289V
F	CORD CO-188 24-INCH (3E2188)	CORD CO-165-( ) 18-INCH (3E2165)	CORD CO-131 36-INCH (3E2165)	CORD CO-165-( ) 18-INCH (3E2165)	CORD CO-131 48-INCH (3E2131)	CORD CO-131 72-INCH (3E2131)	CORD CO-131 108-INCH (3E2131)	APPLETON NO. 7289V	APPLETON NO. 7289V

NOTE:- SIGNAL CORPS STOCK NUMBERS FOR FIRST AND SECOND ECHELON MAINTENANCE ITEMS ARE SHOWN IN PARENTHESES. TL14179

Figure 15. Cording diagram for Radio Sets SCR-193-L, -M, -P, -R, -S, -T, and -U.

11. Installation of Tubes, Accessories, and Other Assembly Details

a. The major components of Radio Set SCR–193–(*) have been discussed in previously issued manuals. Refer to the manuals listed below for information on the installation of fuses, tubes, speakers, headsets, etc.

TM 11–850, for receiver installation data.
TM 11–800, for transmitter installation data.
TM 11–934, for dynamotor installation data.

b. The details of installation, mounting, and checking the operation of equipment in a selected vehicle are covered in various books of the TM 11–2700 series. In some cases, however, manuals covering installations in a particular vehicle have not as yet been issued. Instructions for installing Radio Set SCR–193–(*) in each vehicle may be obtained from Storage and Issue Agency, Office of the Chief Signal Officer, 5,000 Wissahickon Avenue, Philadelphia, Pennsylvania.

c. Auxiliary Antenna AN–24–A is installed when the use of the regular vehicular mast type of antenna is impractical. For example, Antenna AN–24–A is recommended as a replacement for the 15-foot whip antenna when the whip antenna is shorted, or partially shorted, to ground by low hanging branches, especially in damp weather. To use Antenna AN–24–A, unroll it to its full 45-foot length, removing all kinks. Attach an Insulator IN–86 to each end, using the snap fasteners provided. Cut a 2- or 3-foot length from Rope RP–5 and fasten it to the free eye of one insulator. Tie the remaining length of rope to the free eye of the second insulator. Tie the 2- or 3-foot section of rope to the mast base Attach a weight, such as a rock, to the other piece of rope and throw it over a convenient tree limb. Haul up the antenna and fasten the rope to the base of the tree or another convenient point so that the antenna proper is free and clear. Do not overtighten, since tree movement may cause the antenna to snap. The antenna will function most efficiently if no external object touches it. Unfasten the lead-in wire from the binding post on the mast base and fasten it to the thumbscrew on the near side of Antenna AN–24–A. Tune Radio Transmitter BC–191–( ) as usual. The whip antenna also should be tied down so that the top mast section is parallel to the vehicle when the vehicle is in motion.

PART TWO

OPERATING INSTRUCTIONS

Section III. CONTROLS AND THEIR USE

Note. The various controls and their functions are fully discussed in TM 11–800 and TM 11–850.

Section IV. OPERATION

Caution: During equipment operation, a pair of contacts on the transmitter keying relay grounds the receiver antenna lead during the transmission period, and thus disables the receiver. When the transmitter is keyed and the SEND-REC switch is in the SEND position, the receiver antenna lead is automatically grounded by the antenna relay in the receiver. Operating current for the receiver relay is supplied through a pair of contacts on the transmitter keying relay. For maximum protection of the receiver input circuit, keep the SEND-REC switch in the SEND position during either transmission or reception.

12. Starting Procedure

A step-by-step procedure for putting the equipment into operation will be found in TM 11–800 and 11–850.

Note. Sidetone, as applied to Radio Set SCR–193–(*), is a signal provided for monitoring the transmitted signals. When the equipment is operating properly, sidetone is supplied by a separate winding on the interstage transformer in all modes of operation. During voice operation, the sidetone is the amplified voice current. During c-w (continuous-wave) and tone operation, the speech-amplifier stage functions as an audio oscillator to provide the effect. Since sidetone is supplied by the interstage transformer, its presence does *not* necessarily indicate that the other stages of the transmitter are functioning properly. In setting the transmitter to the frequency of another station or to that of a frequency meter, best results will be obtained with the sidetone removed while zero-beating the sets. To remove sidetone from Radio Transmitter BC–191–( ), refer to the detailed instructions in TM 11–800.

13. Operating Instructions

Detailed operating instructions are given in TM 11–800 for Radio Transmitter BC–191–( ), in TM 11–850 for Radio Receiver BC–312–( ), and in FM 24–18 for radio sets in general; therefore only those steps

necessary for operation of Radio Sets SCR–193–(*) in a tactical net are given in this manual. The methods outlined below are an adaptation of those outlined in FM 24–18, but with specific reference to Radio Sets SCR–193–(*).

a. Adjustment of Receiver.

(1) Turn on Radio Receiver BC–312–( ) and allow it to warm up for about 15 minutes so that the frequency drift will not affect the tuning accuracy.

(2) Set the receiver for manual volume control (OFF-MVC-AVC switch at MVG).

(3) Tune the receiver to approximate assigned frequency.

(4) If the signal to be used as a standard is being transmitted on continuous wave, turn the receiver CW-OSC switch ON.

(5) Tune in the signal to be used as a standard and zero-beat the received signal, following the method outlined in FM 24–18.

(6) Do not change the frequency setting of the receiver after zero beat is obtained. The receiver will be used as a frequency standard for the transmitter. Hence, it must be left at the setting of zero beat with the standard frequency. Lock the dial if the receiver is equipped with a dial lock.

b. Adjustment of Transmitter.

(1) Turn on Radio Transmitter BC–191–( ) and allow it to warm up for about 5 minutes.

(2) Using the transmitter calibration chart as a guide, tune the transmitter to the approximate frequency of the receiver.

Note. The SEND–REC switch on all models of Radio Receiver BC–312–( ) (except the BC–312–M and BC–312–N) should be left in the SEND position except during long stand-by periods. In order to tune the transmitter to the frequency of a Radio Receiver BC–312–M or BC–312–N, the receiver antenna lead must be disconnected and the SEND-REC switch placed in the REC position.

(3) Remove the sidetone from Radio Transmitter BC–191–( ) using the methods outlined in TM 11–800.

(4) Set the transmitter ANT COUPLING SWITCH D to position 1 and press the TEST KEY. A heterodyne whistle should be heard in the receiver. If no whistle is heard, slowly adjust transmitter control B (MO TUNING), keeping control C (PA TUNING) in step so that total plate current does not rise above 110 milliamperes. Both controls should be moved about 5 or 10 divisions on either side of their original settings until a heterodyne whistle is picked up in the receiver. When the whistle is heard, reduce the receiver VOL control setting to the lowest point at which the signal can still be heard. Then adjust transmitter controls B (MO TUNING) and C (PA TUNING) until the zero-beat point with the transmitter is heard in the receiver headset. Adjust the transmitter PA TUNING control C for a minimum plate-current reading.

Tune the transmitter antenna circuits of the transmitter for maximum antenna current as outlined in TM 11–800.

Note. Transmitter ANT CIRCUIT switch N should be set at position 2, 3, or 4 (as outlined in TM–11–800), when the 15½-foot whip antenna or the auxiliary Antenna AN–24 is being used. Position 1 of ANT CIRCUIT switch N is to be used only when a half-wave antenna is in service with the transmitter.

(5) If the transmitter antenna circuit tuning pulls the transmitter off zero beat with the receiver, make slight readjustments of all transmitter controls until zero beat is again obtained.

(6) Lock all transmitter tuning controls.

14. Stopping Procedure

a. Radio Transmitter BC–191–( ). Refer to TM 11–800 for instructions on removing the transmitter from service.

b. Radio Receiver BC–312–( ). Refer to TM 11–850 for instructions on removing the receiver from service.

Section V. EQUIPMENT PERFORMANCE CHECK LIST

15. Purpose and Use of Check List

a. General. The equipment performance check list (par. 16) will help the operator to determine whether Radio Set SCR–193–(*) is functioning properly. The check list gives the item to be checked, the conditions under which the item is checked, the normal indications and tolerances of correct operation, and the corrective measures that the operator can take. Items 1 to 15 are checked before starting, items 16 to 19 when starting, items 20 to 36 during equipment operation, and items 37 to 39 when stopping.

b. Action or Condition. For some items the information given in the action or condition column consists of the settings of various switches and controls under which the item is to be checked. For other items it represents an action that must be taken in order to check the normal indication given in the normal indication column.

c. Normal Indications. The normal indications listed include the visible and audible signs that the operator will perceive when he checks the items. In the case of meter readings, the allowable tolerances of the readings are given. When a meter reads between the limits specified, operation can be considered satisfactory. A meter reading outside the limits given is a sign of impending trouble. If the indications are not normal, the operator should apply the recommended corrective measures.

d. Corrective Measures. The corrective measures listed are those that the operator can make without turning the equipment in for repairs.

Reference to part five in the table indicates that the correction of the trouble cannot be effected during operation and that trouble shooting by an experienced repairman is called for. If the set is completely inoperative or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

e. ITEMS 1 TO 19. Items 1 to 19 should be checked each time the equipment is put into operation.

f. ITEMS 20 TO 36. Items 20 to 36 will not only indicate correct meter readings but will also represent the general operating characteristics of the equipment. The operator must become familiar with the characteristics of the set during normal operation; he must use that knowledge as a basis for recognizing changes in audible and visible indications, such as the whine of the dynamotors, relay clicks, positioning of volume and other controls, or any other indications indicative of improper performance.

g. ITEMS 37 TO 39. Items 37, 38, and 39 should be checked whenever the equipment is taken out of operation. Any abnormal indications at this time are probably caused by trouble in the set and should be corrected before the next expected period of operation.

Note. All readings are correct for input voltages of 12 volts. If the input voltage exceeds 12 volts, slightly higher readings may be expected. The corrective measures listed in the last column are to be performed if the readings for the various tests do not agree reasonably with the chart.

16. Equipment Performance Check List

RADIO TRANSMITTER BC-191-( ).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Transmitter tuning unit.	Proper unit for desired frequency range plugged in. Use tuning unit with serial number same as transmitter.		
	2	Key J-45 or Microphone T-17-( ).	Key J-45 or Microphone T-17-( ) plugged into proper place on receiver, or transmitter.		
	3	Transmitter.	Adjust to approximately correct frequency before turning on set.		
	4	TONE-CW-VOICE switch.	Set at type of service desired.		
	5	ANT CIRCUIT switch, N.	Turn to position 4 for frequencies between 1,500 and 2,500 kc. Turn to position 3 or 4 for frequencies between 2,500 and 4,500 kc.		
	6	ANT IND switch, P.	Set at position 1.		

	Item No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	7	BAND CHANGE switch.	Turn to desired band position.		
	8	HEATERS OFF-ON switch (when furnished).	For net operation preheat by turning to ON. Heating period, 15 minutes.		
	9	Loudspeaker LS–3.	Insert in jack marked SPEAKER 2ND AUDIO.		
	10	SEND-REC switch.	Set at SEND position. Radio Receivers BC–312–M and BC–312–N must have this switch in REC position for reception, and at SEND for transmission.		
	11	Headset HS–30–( ).	Insert in jack marked PHONES 2ND AUDIO or PHONES 1ST AUDIO.		
	12	Antenna.	A noise suppression antenna is connected to the NOISE ANT terminal (when furnished).		
	13	FAST TUNING control.	Turn to assigned frequency (approx.).		

RADIO TRANSMITTER BC–191–( ).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
START	14	OFF-ON switch.	Turn to ON position.	M-o and p-a tube filaments light. Dynamotor starts and runs.	Refer to paragraph 47, part five, if indications are abnormal.
	15	Voltmeter on vehicle instrument panel.	Throw voltmeter switch to ON.	Reading of 10.5 volts, or more.	Start vehicle engine.

RADIO RECEIVER BC–312–( ).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
START	16	OFF-MVC-AVC switch.	Turn to MVC or AVC to turn set on.	Dial light will go on, dynamotor will hum. At MVC, VOL control will vary volume without AVC action. At AVC position, VOL control will vary, but with AVC action.	Replace fuse. Refer to TM 11–850.
	17	HEATERS OFF-ON switch (when furnished).	Should be turned to ON 15 minutes before operation.		
	18	CW–OSC OFF–ON switch.	For c-w reception turn to ON.	C-w signals may be tuned in. Transmitter carrier will be heard.	Replace tube. Refer to TM 11–850.

RADIO TRANSMITTER BC–191–( ), C-W OPERATION

	Item No.	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	19	PA TUNING control.	With the TEST KEY held closed, vary control until p-a circuit is tuned to resonance.	80 to 110 ma.	
	20	TEST KEY.	Use while making tuning adjustments.		
	21	ANT IND switch, M.	Tune for resonance as indicated by ANT CURRENT meter.	Maximum reading on ANT CURRENT meter.	Vary ANT IND switch to higher numbered positions until resonance is obtained. Increase coupling.

RADIO TRANSMITTER BC–191–( ), VOICE OPERATION

	Item No.	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	22	TONE-CW-VOICE switch.	Switch at VOICE position. Press TEST KEY. Note reading on TOTAL PL CURRENT meter.	20 ma greater than total c-w meter reading.	If current change is greater or less than 20 ma, adjust MOD BIAS control. Refer to TM 11–800.
	23	MOD BIAS control.	If TOTAL PL CURRENT reading is incorrect, vary.	20 ma above total c-w reading.	Release TEST KEY. Set transmitter OFF - ON switch to OFF. Remove tube compartment sheet. Rotate MOD BIAS control for correct reading after turning transmitter OFF-ON switch to ON.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	24	INPUT LEVEL.	Indistinct reception at receiving point.	TOTAL PL. CURRENT meter reading fluctuates between 300 ma and a lower reading, clear, distinct reception.	Use test receiver at a distance from the transmitter so that the receiver is not overloaded. Release TEST KEY, turn the transmitter OFF-ON switch to OFF. Insert microphone plug in MICRO jack; switch SEND-RECEIVE switch to SEND. Place receiver OFF-ON switch at ON. Remove tube compartment shield. Insert screwdriver in dial rotating device to left of INPUT LEVEL control, and set dial at 1. Set transmitter OFF-ON switch at ON. Depress microphone button, conduct transmission. Obtain report on signal strength and modulation. Vary switch (to left of INPUT LEVEL control) progressively to higher numbers until indistinct transmission is reported. Reset for best performance.

RADIO TRANSMITTER BC–191–( ), TONE OPERATION.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	25	Transmitter OFF-ON switch.	Switch to OFF position. (This is done after set-up for c-w and voice have been completed.)		
	26	TONE-CW-VOICE switch.	Switch to TONE position.		
	27	Transmitter OFF-ON switch.	Turn back to ON.		
	28	TEST KEY.	Depress key.	300 to 350 ma on TOTAL PL CURRENT meter.	
	29	Sidetone.	Heard in receiver output circuit.	Tune in on speaker or headset.	Adjust by varying Potentiometer RS–218 in Junction Box TM–188 or by varying control marked SIDETONE in tube compartment.

RADIO RECEIVER BC–312–( ).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	30	FREQUENCY dial.	Turn to desired frequency.		
	31	CRYSTAL PHASING (when furnished).	Switches crystal phasing in and out of circuit.	Filter is out when arrow on dial points to OUT on panel.	IN on c-w. Rotate for best results.
	32	VOL control.	Increases or decreases volume to desired level.	Volume variation when turned.	Inspect control and associated tubes and circuits.
	33	SEND-REC switch.	Switches antenna for service desired.	SEND for transmission; REC for reception.	Leave on REC during long stand-by periods, since current is drawn in SEND position.
	34	NOISE ADJUST and NOISE BALANCE control (when furnished).	Adjustment of signal-to-noise ratio.		

RADIO TRANSMITTER BC–191–( ).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
STOP	35	OFF-ON switch.	Turn to OFF position.	Filaments go out. Dynamotor stops.	

RADIO RECEIVER BC–312–( ).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
STOP	36	HEATERS OFF-ON switch (when furnished).	Turn to OFF position.		
	37	OFF-MVC-AVC switch.	Turn to OFF position.	Set is put out of service. Dial light goes off. Dynamotor stops.	

PART THREE

PREVENTIVE MAINTENANCE

Section VI. PREVENTIVE MAINTENANCE TECHNIQUES

17. Meaning of Preventive Maintenance

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major breakdowns and unwanted interruptions in service, and to keep the equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent* break-downs and, therefore, the need for repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. The entire system of radio communication depends upon each set's being *on the air* when it is needed and upon its *operating efficiency*. It is vitally important that radio operators and repairmen maintain their radio sets properly.

Note. The operations in sections VI and VII are first and second echelon (organization operators and repairmen) maintenance. Some operations in sections VIII and IX are higher echelon maintenance.

18. Description of Preventive Maintenance Techniques

a. General. Most of the electrical parts used in Radio Set SCR–193–(*) require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques cannot be applied, definite and specific instructions are needed. This section of the manual contains these specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations namely: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout this manual the lettering system for the six operations will be as follows:

F—Feel*	C—Clean
I—Inspect	A—Adjust*
T—Tighten	L—Lubricate*

The first two operations establish the need for the other four. The selection of operations is based on a general knowledge of field needs. For

* The Feel, Adjust, and Lubricate operations are inapplicable to Radio Set SCR–193–(*).

example, the dust encountered on dirt roads during cross-country travel filters into the equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary performance of tightening, cleaning, and lubrication operations, equipment becomes undependable and subject to break-down when the equipment is most needed.

b. INSPECT. Inspection is the most important operation in the preventive maintenance program. A careless observer will overlook the evidences of minor trouble. Although these defects may not interfere with the performance of the equipment, valuable time and effort can be saved if they are corrected before they lead to major break-downs. Make every effort to become thoroughly familiar with the indications of normal functioning, in order to be able to recognize the signs of a defective set. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(1) Overheating, as indicated by discoloration, blistering, or bulging of the parts or surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

(2) Placement, by observing that all leads and cabling are in their original position.

(3) Cleanliness, by carefully examining all recesses in the units for accumulation of dust, especially between connecting terminals. Parts, connections, and joints should be free of dust, corrosion, and other foreign matter. In tropical and high-humidity locations, look for fungus growth and mildew.

(4) Tightness, by testing any connection or mounting which appears to be loose.

c. TIGHTEN AND CLEAN. These operations are self-explanatory. Specific procedures to be followed in performing them are given wherever necessary throughout part three. Whenever a loose connection is tightened, it should be moistureproofed and fungiproofed again by applying the varnish with a small brush. See section IX for details of moistureproofing and fungiproofing.

Caution: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

19. Preventive Maintenance of Radio Transmitter BC–191–( )

For preventive maintenance instructions for Radio Transmitter BC–191–( ) see TM 11–800.

20. Preventive Maintenance of Radio Receiver BC–312–( )

For preventive maintenance instructions for Radio Transmitter BC–312–( ) see TM 11–850.

21. Cords and Cables

a. INSPECT (I). Inspect all interconnecting cables for dirt and grease. Look for cuts or cracks in the insulation. Inspect for frayed insulation at the connector ends. Watch for kinks and strains on the cords and cables. A strain or kink in a cable will soon damage the insulation or break the wires within the cable.

b. TIGHTEN (T). Tighten any loose cable clamps.

c. CLEAN (C). Remove all dirt and other foreign matter from cords and cables with a clean dry cloth. Use dry–cleaning solvent for removing grease or oil. Clean cord plugs with polish, metal, paste.

22. Multiple Connectors

a. INSPECT (I). Inspect multiple connectors for loose connections, broken or bent pins, and stripped threads. Do not attempt to remove individual pins from the connector. Examine for cleanliness and signs of moisture or fungus accumulations.

b. CLEAN (C). Remove all dirt, dust, and moisture from the connectors with a clean dry cloth. Use #0000 sandpaper to remove corrosion or fungus.

23. Antenna

a. INSPECT (I). Inspect antenna mast sections for cleanliness and signs of rust or corrosion. Look for dirt accumulations on the antenna insulators. Look for cracked insulators or grazed surfaces on the insulators. Inspect the insulator mountings for loose mounting nuts. Examine the antenna lead-in for damaged insulation, kinks, strains, or short circuits to grounded mountings. Make sure the antenna mast sections are securely screwed together and either fastened with clamps or taped with friction tape.

b. TIGHTEN (T). Tighten loose mounting screws on the antenna mounting bracket. Tighten loose antenna mast insulator nuts. Be especially careful while tightening the insulator nuts to avoid breaking the insulator or chipping the glazed surface.

c. CLEAN (C). Clean the antenna insulator thoroughly with a clean dry cloth. If heavy accumulations of dirt, grease, or other foreign matter are difficult to remove, use dry-cleaning solvent on the cloth. Remove rust and corrosion on the mast sections or other metal parts of the antenna and its mounting with #0000 sandpaper.

24. Mountings

a. INSPECT (I). Inspect all mounting lugs and nuts to be sure they are tight. Inspect all fasteners on the mountings to be sure that they are securely locked. Look for accumulations of dirt and rust.

b. TIGHTEN (T). Tighten all loose mounting lugs and nuts. Tighten loose locking clamps.

c. CLEAN (C). Remove all dust, dirt, and other foreign matter from the mountings with a stiff brush. Use #0000 sandpaper to remove rust or corrosion. Use touch-up paint to cover any bare spots on the metal after cleaning.

25. Headset, Key, and Loudspeaker (figs. 16 and 17)

a. INSPECT (I). Inspect the external surfaces of the headset, key, and loudspeaker for cleanliness. Inspect the connecting cords for cracked or cut insulation. Examine connecting plugs for corrosion and dirt.

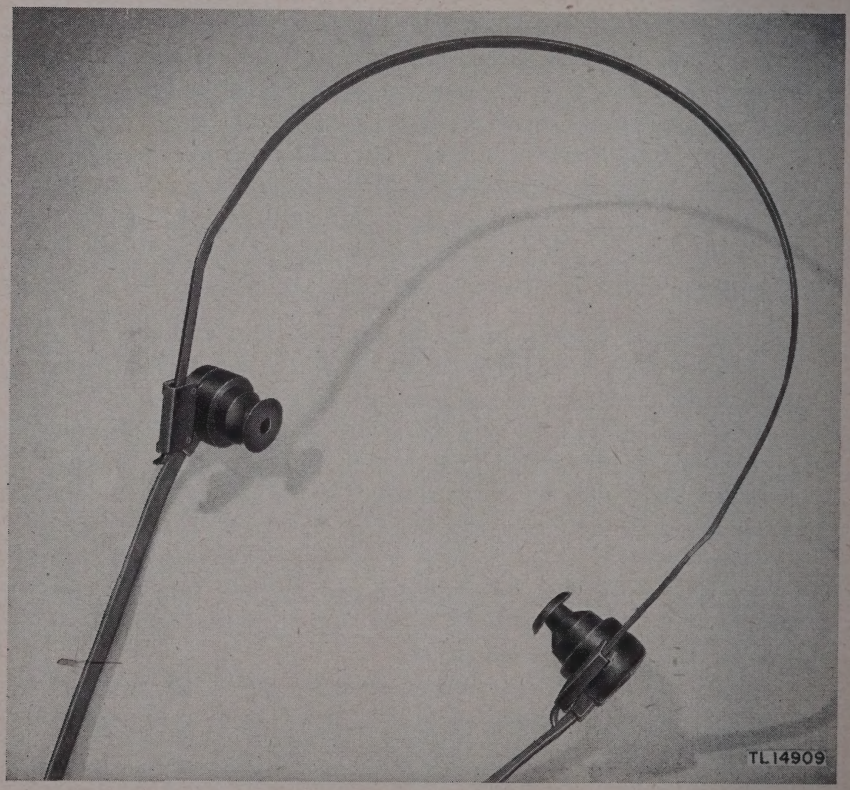


Figure 16. Headset HS-30-( ).

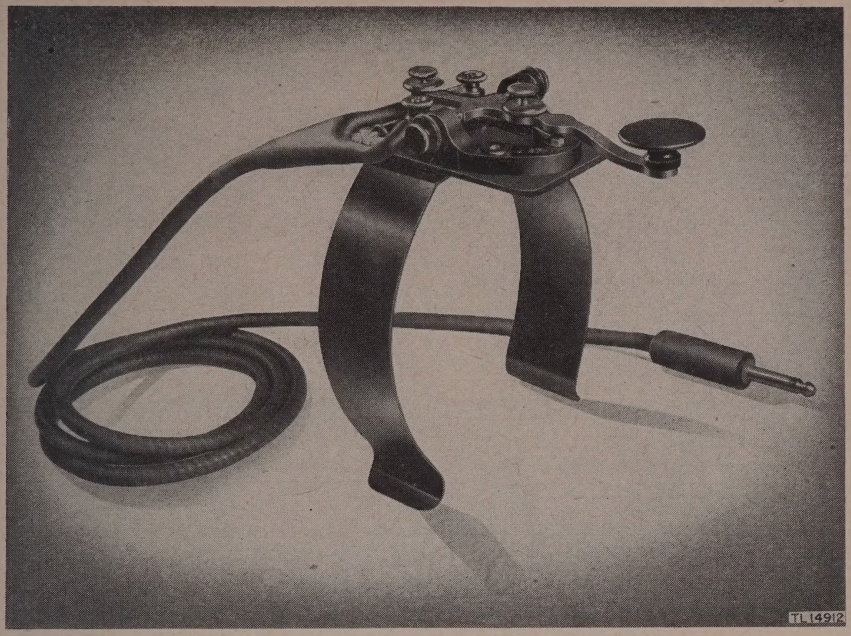


Figure 17. Key J–45.

b. CLEAN (C). Remove all dust, dirt, and other foreign matter with a clean dry cloth or stiff brush. Use dry-cleaning solvent on a clean cloth to remove oil or grease from the connecting cords.

c. TIGHTEN (T). Tighten any loose connections on the key. These connections are usually held with thumbnuts. Keep the thumbnuts tight at all times.

Section VII. ITEMIZED PREVENTIVE MAINTENANCE

26. General

For ease and efficiency of performance, preventive maintenance on Radio Set SCR–193–(*) will be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed on the radio set at specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in section VI. These general instructions are not repeated in this section. When performing preventive maintenance, refer to section VI if more information

is required for the following items. All work is to be performed with the power removed from the equipment. After preventive maintenance has been performed on a given day, the equipment should be put into operation and checked for satisfactory performance.

27. Common Materials Needed

The following materials will be needed in performing preventive maintenance:

Common hand tools
Clean cloth
#0000 sandpaper
Crocus cloth
Solvent, Dry-cleaning, Federal Specification P–S–661a

Note. Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry-cleaning, Federal Specification P–S–661a, is available as a cleaning fluid, through established supply channels. Oil, Fuel, Diesel, U. S. Army Specification 2–102B, may be used for cleaning purposes when dry-cleaning solvent is not at hand. Carbon tetrachloride, or fire-extinguishing liquid (carbon tetrachloride base), will be used, if necessary, *only on contact parts of electronic equipment.*

28. Item 1, Exterior of Radio Set SCR–193–(*)

OPERATIONS.

I T C	Cabinets
I T C	Mountings

29. Item 2, Cords and Cables

OPERATIONS.

I T C	Cable clamps
I C	Cords and cables

30. Item 3, Multiple Connectors

OPERATIONS.

I C	Plugs
I C	Connectors

31. Item 4, Antenna

OPERATIONS.

I T C	Antenna mast sections
I T C	Antenna mast base
I T C	Antenna mounting
I C	Antenna insulator
I C	Lead-in wire
I C	Auxiliary antenna

32. Item 5, Headset, Key, and Loudspeaker

OPERATIONS.

I T C	Key
I C	Headset
I C	Loudspeaker
I C	Interconnecting cords and plugs

33. Preventive Maintenance Check List

a. GENERAL. The following check list is a summary of the preventive maintenance operations to be performed on Radio Set SCR–193–(*). The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipments, perform operations at least as frequently as called for in the check list. The echelon column indicates which operations are first echelon maintenance and which operations are second echelon maintenance. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the "Operations" column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

b. CHECK LIST.

Item No.	Operations	Item	When performed		Echelon
			Daily	Weekly	
1	ITC	Exterior of Radio Set SCR–193–(*)	x		1st
2	ITC	Cords and cables	x		1st
3	IC	Multiple connectors		x	2d
4	ITC	Antenna	x		1st
5	ITC	Key, headset, and loudspeaker	x		1st

F Feel* — I Inspect — T Tighten — C Clean — A Adjust* — L Lubricate*

* The Feel, Adjust, and Lubricate operations are inapplicable to Radio Set SCR–193–(*).

Section VIII. LUBRICATION

34. War Department Lubrication Orders

War Department Lubrication Orders are illustrated, numbered, and dated cards or decalcomania labels which prescribe approved first and second echelon lubrication instructions for mechanical equipment which requires

lubrication by using organizations. Current War Department Lubrication Orders which are available are listed in the latest edition of FM 21–6.

35. Requisition of War Department Lubrication Orders

Posts, camps, stations, and ports of embarkation should requisition their requirements for War Department Lubrication Orders for Signal Corps equipment in conformance with the requisitioning instructions which appear on each War Department Lubrication Order. A serial number between 3001 and 4000 inclusive indicates that the War Department Lubrication Order pertains to Signal Corps equipment. In the absence of specific requisitioning instructions, requisition for War Department Lubrication Orders having a serial number between 3001 and 4000 inclusive should be forwarded to Commanding Officer, Philadelphia Signal Depot, Philadelphia, Pennsylvania. In no instance will requisitions for War Department Lubrication Orders with serial numbers between 3001 and 4000 be addressed to The Adjutant General.

36. Compliance with War Department Lubrication Orders

Instructions contained in War Department Lubrication Orders are mandatory and supersede all conflicting lubrication instructions of an earlier date. Applicable War Department Lubrication Orders which are available will be obtained, carried with the equipment at all times, and fully complied with. Difficulties experienced in obtaining and complying with such orders will be reported through technical channels to the Commanding General, Army Service Forces, Attention: Maintenance Division. For specific instruction for lubrication of Radio Receiver BC–312–( ) see TM 11–850. For specific instructions for lubrication of Radio Transmitter BC–191–( ) see TM 11–800. For specific instructions for lubrication of Dynamotor BC–77–( ) see TM 11–934.

Section IX. MOISTUREPROOFING AND FUNGIPROOFING

37. General

When operated in tropical areas where temperature and relative humidity are extremely high. Signal Corps equipment requires special attention. These are some of the problems met:

a. Resistors, capacitors, coils, chokes, transformer windings, etc., fail because of the effects of fungus growth and excessive moisture.

b. Electrolytic action, often visible in the form of corrosion, takes place in resistors, coils, chokes, transformer windings, etc., causing eventual break-down.

c. Hook-up wire insulation and cable insulation break-down. Fungus growth accelerates deterioration.

d. Moisture forms electrical leakage paths on terminal boards and insulating strips, causing flash-overs and crosstalk.

e. Moisture provides leakage paths between battery terminals.

38. Treatment

A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied with a spray gun or brush. Refer to TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing and the supplies and equipment required in this treatment.

Caution: Varnish spray may have poisonous effects if inhaled. To avoid inhaling spray, use respirator if available; otherwise, fasten cheesecloth or other cloth material over nose and mouth. Never spray varnish or lacquer near an open flame. Do not smoke in a room where varnish or lacquer is being sprayed. The spray may be highly explosive.

39. Radio Receiver BC–312–( )

See TM 11–850 for complete instructions for treating Radio Receiver BC–312–( ).

40. Radio Transmitter BC–191–( )

See TM 11–800 for complete instructions for treating Radio Transmitter BC–191–( ).

41. Dynamotor BD–77–( )

See TM 11–934 for complete instructions for treating Dynamotor BD–77–( ).

42. Junction Box TM–188

a. Preparation. Make all repairs and adjustments necessary for the proper operation of the equipment.

b. Disassembly.

(1) Remove screws holding cover on junction box and remove the cover.

(2) Separate wires in junction box to expose surfaces for treatment.

(3) Clean all dirt, dust, rust, fungus, oil, grease, etc., from the equipment to be processed.

c. MASKING. It is not necessary to mask the components of Junction Box TM–188–( ).

d. DRYING. Place components to be treated in oven or under heat lamps and dry for 2 or 3 hours at 160° F.

Caution: Do not exceed 160° F. If wax should begin to melt in any of the components, decrease the temperature and increase the baking time approximately 1 hour for each decrease of 10° F. in temperature.

e. VARNISHING. Apply three coats of moistureproofing and fungiproofing varnish (Lacquer, Fungus-resistant, Spec. No. 71–2202, (Stock No. 6G1005.3), or equal) to all components to be treated, allowing a 15- to 20-minute drying period after each coat.

f. REASSEMBLY. Reassemble the unit following instructions for disassembly in reverse order, and test its operation.

g. MARKING. Mark the equipment with "MFP" and the date of treatment. Place the marking near the nameplate or at some conspicuous point on the equipment.

EXAMPLE: MFP–8 June 1944.

43. Radio Terminal Box

a. PREPARATION. Make all repairs and adjustments necessary for the proper operation of the equipment.

b. DISASSEMBLY.

(1) Remove screws holding cover on terminal box and remove the cover.

(2) Separate wires in terminal box to expose surface for treatment.

(3) Clean all dirt, dust, rust, fungus, oil, grease, etc., from the equipment to be processed.

c. MASKING. It is not necessary to mask the components of the radio terminal box.

d. DRYING. Place the components to be treated in oven or under heat lamps and dry for 2 or 3 hours at 160° F.

Caution: Do not exceed 160° F. If wax should begin to melt in any of the components, decrease the temperature and increase the baking time approximately 1 hour for each decrease of 10° F. in temperature.

e. VARNISHING. Apply three coats of moistureproofing and fungiproofing varnish (Lacquer, Fungus-resistant, Spec. No. 71-2202, (Stock No. 6G1005.3), or equal) to all components to be treated, allowing a 15- to 20-minute drying time after each coat.

f. REASSEMBLY. Reassemble the unit following instructions for disassembly in reverse order, and test its operation.

g. MARKING. Mark the equipment with "MFP" and the date of treatment. Place the marking at some conspicuous point on the equipment.

EXAMPLE: MFP–8 June 1945.

PART FOUR

AUXILIARY EQUIPMENT

(NOT USED)

PART FIVE

REPAIR INSTRUCTIONS

Note. Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on WD AGO Form 468 (Unsatisfactory Equipment Report); by Army Air Forces, on Army Air Forces Form 54 (Unsatisfactory Report). If either form is not available, prepare the data according to the sample form reproduced in figure 24.

Section X. THEORY OF EQUIPMENT

44. General

Repair instructions and theory of Radio Transmitter BC–191–( ), Radio Receiver BC–312–( ), and Dynamotor Unit BD–77–( ), which are the major components of Radio Set SCR–193–(*), will not be given in this manual. Refer to TM 11–800 for Radio Transmitter BC–191–( ), to TM 11–850 for Radio Receiver BC–312–( ), and to TM 11–934 for Dynamotor Unit BD–77–( ).

45. Over-all System Function

The over-all function of all models of Radio Set SCR–193–(*) is the same: to provide two-way radio communication. The differences between models are in their physical arrangement and in their cording. The cording for all sets is shown in figures 14 and 15. All models can be operated from the receiving position on cw, tone, or voice.

Section XI. TROUBLE SHOOTING

46. General Trouble-Shooting Information

No matter how well equipment is designed and manufactured, faults occur in service. When such faults occur, the repairman must locate and correct them quickly. This section contains general information to aid personnel engaged in the important duty of trouble shooting.

a. Trouble-shooting Data. Take advantage of the material contained in this manual to help locate faults more rapidly. Consult the following trouble-shooting data when necessary:

(1) Block diagram of Radio Set SCR–193–(*) (fig. 2).

(2) Cording diagrams of Radio Set SCR–193–(*) (figs. 14 and 15).

(3) Wiring diagrams of cords used with Radio Set SCR–193–(*) (figs. 18 through 23).

(4) TM 11–800. This manual contains schematic diagrams, voltage and resistance charts, and trouble-shooting charts for Radio Transmitter BC–191–( ).

(5) TM 11–850. This manual contains schematic diagrams, voltage and resistance charts, and trouble-shooting charts for Radio Receiver BC–312–( ).

(6) 11–934. This manual contains schematic diagrams, voltage and resistance charts, and trouble-shooting charts for Dynamotor Unit BC–77–( ).

b. Trouble-shooting Steps. The first step in servicing a defective radio set is to sectionalize the fault. Sectionalization means tracing the fault to the component or circuit responsible for the abnormal operation of the set. The second step is to localize the fault. Localization means tracing the fault to the defective part. Some faults such as burned-out resistors, r-f (radio-frequency) or h-v (high-voltage) arcing, and shorted power transformers can be located by sight, smell, and hearing. The majority of faults, however, must be located by checking voltage and resistance.

c. Sectionalization. Careful observation of the performance of the set while turning the equipment on often sectionalizes the fault to the transmitter, the receiver, or the power source. Additional sectionalizing of the fault is discussed in paragraphs 47 and 48.

d. Localization. Localization of faults will not be discussed in this manual. Complete information for localizing faults is contained in the technical manuals for the major components of Radio Set SCR–193–(*).

e. Voltage Measurements. Voltage measurements are an almost indispensable aid to the repairman, because most troubles either result from abnormal voltages or produce abnormal voltages. Voltage measurements are taken easily, because they are always made between two points in a circuit and the circuit need not be interrupted.

(1) Voltages listed on most voltage charts are measured between ground and the points indicated.

(2) Always begin by setting the voltmeter to its highest range to minimize the possibility of overloading the meter. Then, if it is necessary to obtain increased accuracy, set the voltmeter to a lower range.

(3) In checking cathode voltage, remember that an indication can be obtained when the cathode resistor is actually open. The resistance of the meter may act as a cathode resistor. Thus, the cathode voltage may be approximately normal only as long as the voltmeter is connected. Be-

fore the cathode voltage is measured, make a resistance check with a cold circuit to determine whether the cathode resistor is normal.

f. Precautions Against High Voltage. Certain precautions must be followed when measuring voltages above a few hundred volts. High voltages are dangerous and can be fatal. When it is necessary to measure high voltages, observe the following rules:

(1) Connect the ground lead to the voltmeter.

(2) Place one hand in your pocket. This will eliminate the possibility of making accidental contact with either ground or another part of the circuit and causing the electricity to travel from one hand to the other.

(3) If the voltage is less than 300 volts, connect the test lead to the hot terminal (which may be either positive or negative with respect to ground).

(4) If the voltage is greater than 300 volts, shut off the power, connect the hot lead, step away from the voltmeter, turn on the power, and note the voltmeter indication. Do not touch any part of the voltmeter, particularly when measuring the voltage between two points which are above ground.

g. Voltmeter Loading. It is essential that the voltmeter resistance be at least 10 times the resistance of the circuit across which the voltage is measured. If the voltmeter resistance is comparable to the circuit resistance, the voltmeter will indicate a voltage lower than the actual voltage present when the voltmeter is removed from the circuit.

(1) The resistance of a voltmeter on any range can always be calculated by the following simple rule: Voltmeter resistance equals the ohms per volt multiplied by the full-scale range in volts. For example: The resistance of a 1,000-ohm-per-volt meter on the 300-volt range is 1,000 x 300 = 300,000 ohms.

(2) To minimize voltmeter loading in high-resistance circuits, use the highest range available. Although only a small deflection will be obtained (possibly only 5 divisions on a 100-division scale), the accuracy of the voltage measurement will be increased. The decreased loading of the voltmeter will more than compensate for the inaccuracy which results from reading only a small deflection on the voltmeter.

(3) When a voltmeter is loading a circuit, the effect can always be noted by comparing the voltage indication on two successive ranges. Voltmeter loading is excessive if the voltage indications on the two ranges do not agree. The indication (not the deflection) on the higher range will be greater than that on the lower range. If the voltmeter is loading the circuit heavily, the deflection (not the indication) of the pointer will remain nearly the same when the voltmeter is switched from one range to the other.

(4) The ohm-per-volt sensitivity of the voltmeter used to obtain the voltages recorded on most voltage charts is noted on each chart. Use a voltmeter having the same sensitivity so that the loading effect will not have to be considered.

47. Trouble-Shooting Procedures

The accompanying trouble-shooting charts, if properly used, simplify trouble shooting. The chart in paragraph 48 covers the sectionalization of trouble in Radio Set SCR–193–(*). This chart lists symptoms which may be recognized easily by the operator, and gives the probable location of the trouble as well as the recommended correction. It tells the operator whether the trouble is in the receiver, the transmitter, the dynamotor, or the cording. By following the steps in the chart, the operator can isolate the fault to one particular component, and thus save time that might otherwise be lost in checking components which are free of trouble. The chart in paragraph 51 covers the wiring in the cords between the receiver and the transmitter through the junction box. The first chart will be used mainly by the operator, while the second chart will be used by the repairman. Wiring diagrams for all cords except those for the key, the loudspeaker, and the battery are shown in figures 18 through 23. For all other trouble-shooting information, refer to the technical manuals for the components.

48. Sectionalizing Trouble in Radio Set SCR–193–(*)

Symptoms	Probable trouble	Corrections
1. Radio Receiver BC–312–( ) inoperative; pilot lamps not lighted; Radio Transmitter BC–191–( ) operative.	1. Fuse F1 and F2 in receiver blown. Open conductor in receiver power cord. Pilot lamp burned out.	1. Replace fuses. Repair or replace power cord. Replace pilot lamp. (See TM 11–850.)
2. Receiver inoperative; pilot lamps lighted; transmitter operative.	2. Fuse F1 in receiver blown. One or more defective tubes in receiver. Antenna relay RLI contacts shorted. Defective receiver dynamotor.	2. Replace fuse. Replace defective tubes. Repair relay contacts or replace relay. Repair or replace dynamotor. (See TM 11–850.)
3. Receiver operative; pilot lamps not lighted; transmitter operative.	3. Fuse F2 blown. Pilot lamp burned out.	3. Replace fuse. Replace lamp. (See TM 11–850.)
4. Receiver normal; transmitter tube filaments lighted; Dynamotor Unit BD–77–( ) inoperative.	4. Fuse 1605 in dynamotor unit blown. Dynamotor brushes defective. Dynamotor armature defective.	4. Replace fuse. Replace brushes. Replace dynamotor. (See TM 11–934.)
5. Receiver normal; transmitter tube filaments not lighted; dynamotor unit operative.	5. Fuse 1604 in dynamotor unit blown. Open filament wiring. Tubes burned out.	5. Replace fuse. (See TM 11–934.) Repair wiring. Replace tubes. (See TM 11–800.)
6. Receiver normal; transmitter tube filaments lighted; dynamotor operative; transmitter inoperative.	6. Fuse 1608 in dynamotor unit blown. Fuse 1172 in transmitter blown. High-voltage cord open.	6. Replace fuse. (See TM 11–934.) Replace fuse. (See TM 11–800.) Repair or replace cord.
7. Receiver normal; transmitter will not turn on.	7. Interlock switch 1102 defective or not operated.	7. Replace switch. Push tuning unit firmly in place to operate switch. (See TM 11–800.)
8. Receiver normal; transmitter operative; no sidetone in headset or loudspeaker.	8. Keying relay contacts defective. Open conductor in receiver or transmitter cord to junction box.	8. Clean and adjust relay contacts. (See TM 11–800.) Repair or replace cord. (See par. 49.)
9. Receiver normal; transmitter inoperative when key or microphone switch is operated; transmitter operates when TEST KEY is pressed.	9. Open conductor or microphone cord. Defective microphone switch. Key or microphone plug not making contact in jack.	9. Repair or replace cord. Repair or replace switch. Clean plugs and push firmly into jacks.

49. Cording Continuity Tests

Use the low range of an ohmmeter to check for broken wires in the cording or loose connections in the junction box and plugs. Disconnect all plugs and the 12-volt storage battery, and check for zero resistance between the points indicated in the following chart.

From Plug	Contact	To Plug	Contact	Circuit
PL–64	20	PL–114	M and T	+ 12-volt
PL–64	21	PL–114	J	antenna relay
PL–64	23	PL–114	E	microphone
PL–64	24	PL–114	D, F, G, S, V, and ground	— 12-volt and ground
PL–64	33	PL–114	H	sidetone
PL–64	34	PL–114	N and U	key and microphone

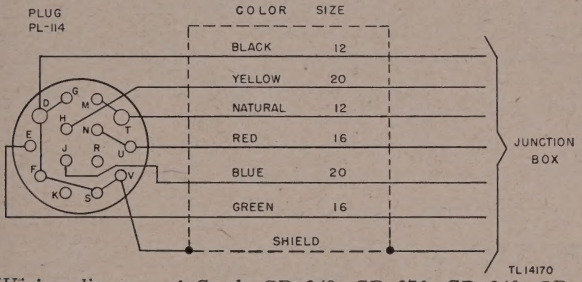


Figure 18. Wiring diagram of Cords CD–269, CD–270, CD–360, CD–411, CD–422, CD–434, and CD–474.

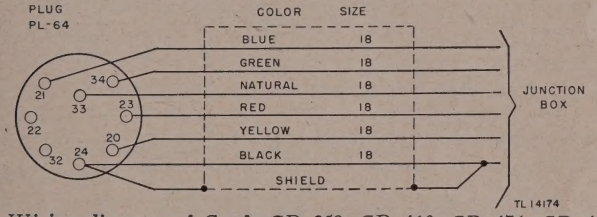


Figure 19. Wiring diagram of Cords CD–359, CD–410, CD–471, CD–603, CD–1087, and CD–1171.

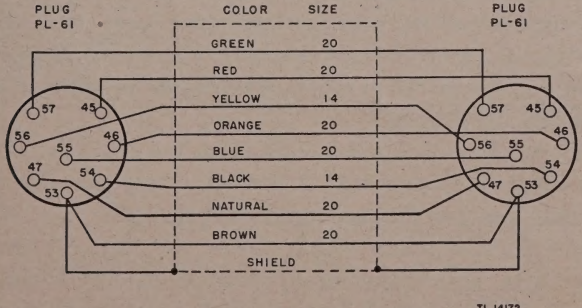


Figure 20. Wiring diagram of Cords CD–226, CD–239, CD–346, CD–424, CD–472, CD–676, and CD–1172.

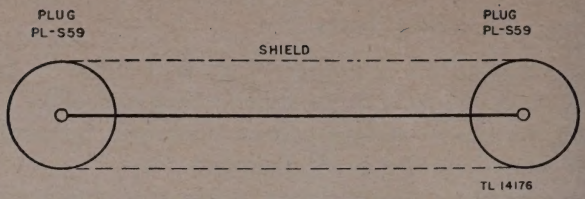


Figure 21. Wiring diagram of Cords CD–169, CD–175, CD–237, CD–320, CD–440, CD–473, and CD–670.

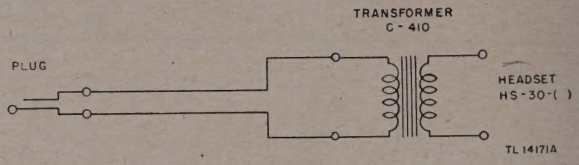


Figure 22. Wiring diagram of Cord CD–604.

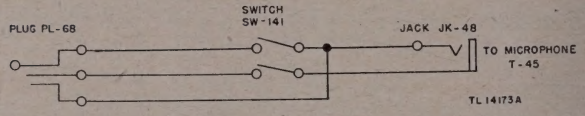


Figure 23. Wiring diagram of Cord CD–318–( ).

50. Unsatisfactory Equipment Report (fig. 24)

a. When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Report, WD AGO Form 468, should be filled out and forwarded through channels to the Chief Signal Officer, Washington 25, D. C.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form 54 should be filled out and forwarded through channels.

c. If either form is not available, Form 468 (fig. 24) may be reproduced, filled out, and forwarded through channels. When Army Air Forces Form 54 is required but unavailable, reproduce Form 468 and forward it through channels in accordance with directions on Form 468.

WAR DEPARTMENT

UNSATISFACTORY EQUIPMENT REPORT

FOR	TECHNICAL SERVICE: Signal Corps — MATERIEL		DATE: 1 Feb 45
FROM	ORGANIZATION: 175 Signal Repair Co.		STATION: APO 102
TO	NEXT SUPERIOR HEADQUARTERS: Supply Sec. Hq Fourth Army Sig Sv.	STATION: APO 110	TECHNICAL SERVICE: Signal Corps

COMPLETE MAJOR ITEM

NOMENCLATURE	TYPE	MODEL	
Radio Transmitter BC-123-A	Ground, vehicular	A	
MANUFACTURER	**U. S. A. REG. No.**	**SERIAL NO.**	**DATE RECEIVED**
American Radio Corp	Order No. 1234-Phila-45	12345	5 Jan 45

EQUIPMENT WITH WHICH USED (*If applicable*): Radio Set SCR-456-A — Tank, Medium, M4

DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE

PART No.	TYPE	MANUFACTURER	DATE INSTALLED
Sig C Stk. No. 3E47-2	Capacitor C20: fixed; 1-mf; 500 vdcw	American Radio Corp	when manufactured

DESCRIPTION OF FAILURE AND PROBABLE CAUSE (*If additional space is required, use back of form*)

Capacitor C20 shorts out due to humid operating conditions

DATE OF INITIAL TROUBLE	TOTAL TIME INSTALLED			TOTAL PERIOD OF OPERATION BEFORE FAILURE					
	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
15 Jan 45	-	-	-	0	0	5		-	-

BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN

Operation in tropics; heavy rainfall. Was replaced and set given moistureproofing and fungiproofing treatment, 20 Jan 45.

TRAINING OR SKILL OF USING PERSONNEL			RECOMMENDATIONS (*If additional space is required, use back of form*)
POOR	FAIR	GOOD	
		X	Substitute capacitor designed for tropical operation

ORIGINATING OFFICER

TYPED NAME, GRADE, AND ORGANIZATION	SIGNATURE
E. A. WILSON, 1st Lt., Sig C. 175 Sig Repair Co.	E. A. Wilson

FIRST ENDORSEMENT

TO CHIEF	TECHNICAL SERVICE	OFFICE	
NAME, GRADE, AND STATION		STATION	DATE

Instructions

1. It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
2. This form will be used for reporting manufacturing, design, or operational defects in matériel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of matériel.
3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair or the issue of parts and equipment. It does not replace currently authorized operational or performance records.
4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (change No. 3).
5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches, or other illustrative material are highly desirable.
6. When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.
7. This form will be made out in triplicate by using or service organization. Two copies will be forwarded direct to the technical service; one copy will be forwarded through command channels.
8. Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. Form No. 468
30 August 1944

This form supersedes W. D., A. G. O. Form No. 468, 1 December 1943, which may be used until existing stocks are exhausted.

U. S. GOVERNMENT PRINTING OFFICE 16—41546-1

TL 19589

Figure 24. WD, AGO Form No. 468, with sample entries.

Section XII. ALIGNMENT AND ADJUSTMENT

51. Sidetone Reduction

Note. Refer to TM 11–800 for alignment instructions for Radio Transmitter BC–191–( ), and to TM 11–850 for Radio Receiver BC–312–( ).

a. It is desirable under certain conditions to reduce or eliminate the sidetone volume of Radio Sets SCR–193–D. This can be accomplished without opening either the transmitter or receiver, as follows:

(1) Remove the junction box cover, and at Terminal Block TM–183 remove the yellow lead of the receiver cable from terminal No. 1 (or No. 6) and connect it to terminal No. 13.

(2) Remove the natural lead of the transmitter cable from terminal No. 6 and connect it to terminal No. 12.

(3) Connect a 50,000-ohm, ½-watt resistor between terminals No. 12 and 14.

(4) Mount a single-pole, single-throw toggle switch on the junction box and connect it to terminals No. 13 and 14.

b. This modification connects the switch and resistor in series with the sidetone circuit, thus reducing the volume and making it possible to eliminate the sidetone by opening the switch.

APPENDIX I

MAINTENANCE PARTS

For maintenance parts information see sections of Army Service Forces Signal Supply Catalog SIG–7 and SIG–8. The appropriate sections of the ASF Signal Supply Catalog for Radio Set SCR–193–(*) are:

SIG 7–SCR–193, Radio Set SCR–193, Organizational Spare Parts.
SIG 7–BC–191, Radio Transmitter BC–191, Organizational Spare Parts.
SIG 7–BC–312, Radio Receiver BC–312, Organizational Spare Parts.
SIG 7–HS–30, Organizational Spare Parts.
SIG 8–SCR–193, Radio Set SCR–193, Higher Echelon Spare Parts.
SIG 8–BC–191, Radio Transmitter BC–191, Higher Echelon Spare Parts.
SIG 8–BC–312, Radio Receiver BC–312, Higher Echelon Spare Parts.
SIG 8–BD–77, Dynamotor Unit BD–77, Higher Echelon Spare Parts.
SIG 8–HS–30, Headset HS–30, Higher Echelon Spare Parts.
SIG 8–MP–57, Mast Base MP–57, Higher Echelon Spare Parts.
SIG 8–T–17, Microphone T–17, Higher Echelon Spare Parts, when published.
SIG 8–TM–188, Terminal TM–188, Higher Echelon Spare Parts.
SIG 8–TU–5, –6, –7, Transmitter Tuning Units TU–5, –6, –7, Higher Echelon Spare Parts.

APPENDIX II

REFERENCES

1. Supply Publications

SIG 1	Introduction to ASF Signal Supply Catalog.
SIG 2	Complete Index to ASF Signal Supply Catalog.
SIG 3	List of Items for Troop Issue.
SIG 4–1	Allowances of Expendable Supplies.
SIG 4–2	Allowances of Expendable Supplies for Schools, Training Centers, and Boards.
SIG 5	Stock List of All Items.
SIG 6	Sets.
SB 11–10	Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.
SB 11–17	Electron Tube Supply Data.

2. Technical Manuals on Auxiliary Equipment and Test Equipment

TM 11–300	Frequency Meter Sets SCR–211–( ).
TM 11–303	Test Sets I–56–C, I–56–D, I–56–H, and I–56–J.
TM 11–307	Signal Generators I–72–( ).
TM 11–321	Test Set I–56–E.
TM 11–472	Repair and Calibration of Electrical Measuring Instruments.
TM 11–2613	Voltohmmeter I–166.
TM 11–2626	Test Unit I–176.
TM 11–2627	Tube Tester I–177.

3. Painting, Preserving, and Lubrication

Lubrication Order No. 3004	Radio Transmitter BC–191.
Lubrication Order No. 3003	Radio Receiver BC–312.

4. Shipping Instructions

U. S. Army Spec No. 100–14A	Army-Navy General Specification for Packaging and Packing for Oversea Shipment.

5. Decontamination

TM 3–220 Dec[redacted]tion.

6. Demolition

FM 5-25 Explosives and Demolitions.

7. Camouflage

FM 5–20 Camouflage, Basic Principles.

8. Other Technical Publications

WD Pamphlet 12–6	List of Administrative and Supply Publications.
FM 21–6	List of Publications for Training.
FM 21–7	List of Training Films, Film Strips, and Film Bulletins.
FM 21–8	Military Training Aids.
FM 21–40	Defense Against Chemical Attacks.
FM 24–6	Radio Operator's Manual, Army Ground Forces.
CC BP 2–2	Combined Operating Signals.
FM 24–18	Radio Communication.
TB SIG 5	Defense Against Radio Jamming.
TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Ground Signal Equipment.
TB SIG 69	Lubrication of Ground Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.

TM 1–455	Electrical Fundamentals.
TM 11–227	Signal Communication Equipment Directory, Radio Communication Equipment.
TM 11–310	Schematic Diagrams for Maintenance of Ground Radio Communication Sets.
TM 11–314	Antennas and Antenna Systems.
TM 11–453	Shop Work.
TM 11–454	The Radio [illegible]
TM 11–455	Radio Fu[illegible]tals.
TM 11–462	Reference Data.
TM 11–483	Suppression of Radio Noises.
TM 11–496	Training Text and Laboratory Exercises for Amplitude-modulated Radio Sets.
TM 11–499	Radio Propagation.
TM 11–800	Radio Transmitter BC–191–A, B, C, D, E, and BC–AA–191.
TM 11–850	Radio Receivers BC–312–( ), BC–314–( ), BC–342–( ), and BC–344–( ).
TM 11–934	Dynamotor Unit BD–77–( ).
TM 11–2701	Installation of Radio Equipment in Car, Half-track, M2.
TM 11–2702	Installation of Radio Equipment in Car, Light Armored.
TM 11–2707	Installation of Radio Equipment in Truck, ¼-ton, 4x4, Amphibian.
TM 11–2710	Installation of Radio Equipment in Truck, ¾-ton, 4x4, Carryall.
TM 11–2711	Installation of Radio Equipment in Carrier, Personnel Half-track, M5, M5A1.
TM 11–2714	Installation of Radio Equipment in Carrier, Personnel, Half-track M3.
TM 11–2715	Installation of Radio Equipment in Truck, ¼-ton, 4x4.
TM 11–2717	Installation of Radio Equipment in Scout Car M3A1.
TM 11–2719	Installation of Radio Equipment in Car, Half-track, M9A1 (when published).
TM 11–2721	Installation of Radio Equipment in Carrier, Personnel Half-track, M3A1 (when published).
TM 11–2722	Installation of Radio, Interphone, and Facsimile Equipment in Car, Half-track, M3A2 (when published).

TM 11–2725	Installation of Radio Equipment in Truck, ¾-ton, 4x4, Weapons Carrier.
TM 11–2726	Installation of Radio and Interphone Equipment in Truck, ¾-ton, 4x4, Command and Reconnaissance.
TM 11–2733	Installation of Radio Equipment in Light Cargo Carrier M29 (when published).
TM 37–250	Basic Maintenance Manual.

9. Forms

WD AGO Form 468 (Unsatisfactory Equipment Report). (See fig. 24.)
Army Air Forces Form 54 (Unsatisfactory Report).

10. List of Abbreviations

amp	ampere
a-v-c	automatic-volume-control
c-w	continuous-wave
h-f	high-frequency
h-v	high-voltage
i-f	intermediate-frequency
kc	kilocycle
l-f	low-frequency
l-v	low-voltage
ma	milliampere
m-o	master-oscillator
mopa	master-oscillator power-amplifier
m-v-c	manual-volume-control
p-a	power-amplifier
r-f	radio-frequency

11. Glossary

See glossary in TM 11–455.